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THESIS

MANAGEMENT CONTROL IN THE ACQUISITION OF AUTOMATIC DATA PROCESSING AND INFORMATION SYSTEMS COMPONENTS

by

Robert J. Mundell

December 1985

Thesis Co-advisors: Ken J. Euske
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The conclusions contained in this thesis identify strengths and eaknesses of the ADP/IS LCM and CAP systems. Strengths include (1) a ell-documented programming and budget formulation system for investment ype ADP/IS equipment components and (2) a well-documented LCM process or ADP/IS. Weaknesses include (1) the lack of a formalized decision echanism to allot apportioned CAP funds given the occurrence of

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contingencies during budget execution and (2) a potential for not effectively executing the defined interfaces between the LCM and CAP systems. Specific recommendations are provided to (1) improve the management control of CAP funds during budget execution given the occurrence of expected contingencies and to (2) reduce the potential for ineffective interface between the two systems.

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Management Control in the Acquisition of Automatic Data Processing and Information Systems Components

by

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Submitted in partial fulfillment of the
requirements for the degree of

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from the

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ABSTRACT

The objective of this thesis is to review the system of management control within the Department of the Navy (DON) for the acquisition of automatic data processing and/or information system (ADP/IS) equipment components. Specific areas described in the research include the DON Life Cycle Management (LCM) system for ADP/IS and the operation of the DON computer acquisition program (CAP) within the Department of Defense (DOD) Planning, Programming and Budgeting System (PPBS).

The conclusions contained in this thesis identify strengths and weaknesses of the ADP/IS LCM and CAP systems. Strengths include (1) a well-documented programming and budget formulation system for investment type ADP/IS equipment components and (2) a well-documented LCM process for ADP/IS. Weaknesses include (1) the lack of a formalized decision mechanism to allot apportioned CAP funds given the occurrence of contingencies during budget execution and (2) a potential for not effectively executing the defined interfaces between the LCM and CAP systems. Specific recommendations are provided to (1) improve the management control of CAP funds during budget execution given the occurrence of expected contingencies and to (2) reduce the potential for ineffective interface between the two systems.

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I. INTRODUCTION

A. BACKGROUND

Over the past several years as the Department of the Navy (DON) has moved towards its 600 ship goal, the Navy's need for more and better information on which to base most decisions has increased rapidly. During the same period the advances in the state of the art in information technology have been notable. As a result of these changes, the demand for new automatic data processing and/or information systems (ADP/IS) is growing. The growth in demand is reflected in the increase in the requested budget for the DON computer acquisition program (CAP). For fiscal year 1985, the DON requested a CAP budget of $242.7M for its acquisition of non-tactical general purpose ADP/IS equipment. This is more than double the previous year budget request. The Navy should benefit by having as effective and efficient a system of ADP/IS acquisition as possible.

This thesis is an attempt to identify the DON systems used to control the acquisition of ADP/IS equipments (resources) and to identify strengths and weaknesses of that system by reviewing it in terms of the theoretical concept of a management control system. Secondly, recommendations to improve the existing DON system are made based on the findings of the study.

B. OBJECTIVES

The difficulties inherent in measuring the effectiveness or the efficiency of organizational systems, particularly in government or other not-for-profit organizations, are addressed very thoroughly by Quade (1982) and by Hitch and McKean (1960). The major obstacles to objective evaluation are (1) the lack of measurable organizational outputs and (2) the resulting lack of appropriate measures of effectiveness.

This thesis does not purport to evaluate the DON ADP/IS acquisition control system as either a good or a bad system. The objective of the thesis is to examine the existing system against a theoretical framework as a means of identifying possible strengths and/or weaknesses of the actual system. The specific objectives of the thesis are:

(1) To describe a theoretical framework of management control;

(2) To describe the actual management control system used within the DON with respect to the acquisition of ADP/IS;

(3) To present a case study in the operation of the actual system;

(4) To compare the actual management control system to the theoretical framework of management control; and

(5) To provide conclusions and recommendations based on that comparison.

C. RESEARCH QUESTIONS

The primary and subsidiary research questions are as follows:

Primary: What system (or systems) does the DON use to control the acquisition of ADP/IS equipment components?

Subsidiary: (1) How does the actual system of control compare to the theoretical system of management control?

(2) What recommendations can be made to correct any weaknesses noted?

D. METHODOLOGY

The information needed to achieve the objectives stated above was obtained by the following method:

(1) A comprehensive review of DOD and DON regulations and procedures relevant to the acquisition and funding of ADP/IS was conducted, with emphasis placed on activities performed at the headquarters (major claimant and above) level.

(2) Managers who operate the DON life cycle management (LCM) system for ADP/IS and the CAP at the headquarters level were interviewed to discuss the LCM and CAP systems as the systems are described in the DON literature.

(3) A search of the management control literature was conducted which led to the development of a management control framework against which the actual DON system could be compared.

E. SUMMARY OF FINDINGS

The DON attempts to control the acquisition of ADP/IS through the operation of two management systems. The first is the life cycle management (LCM) system which is described in and implemented by Secretary of the Navy instruction (SECNAVINST) 5231.1B, "LIFE CYCLE MANAGEMENT (LCM) POLICY AND APPROVAL REQUIREMENTS FOR INFORMATION SYSTEM (IS) PROJECTS," 8 March 1985. This system was found to be well documented

in the DOD and DON literature. The LCM system relies on the second system, the computer acquisition program (CAP), for final approval of investment funding decisions. The primary weakness noted in the LCM system is a potential for inappropriate execution of the defined formal interfaces between the LCM system and the CAP. Failure to appropriately execute the interfaces between the two systems can lead to acquisition project instability and project management frustration.

The CAP, which exists within the planning, programming, and budgeting system (PPBS), is also a well-documented system in the DOD and DON literature. As noted above, the CAP system is the source of investment funding for the acquisition of ADP/IS. In addition to the interface problem with the LCM system noted above, the CAP system has a second notable weakness. The CAP system lacks a formal decision mechanism to allot funds in the event that the available CAP funds are less than the original planning estimates. The lack of this mechanism could result in a reduction of the effectiveness and efficiency of the total system in the application of available resources to the acquisition of ADP/IS.

F. ORGANIZATION OF THE STUDY

The thesis is composed of four principal parts. The first part consists of Chapter I, an introduction to the thesis. The second part consists of Chapter II and presents the theoretical framework of management control. Part III, Chapters III, IV and V, describes the DON LCM system for ADP/IS and

the Computer Acquisition System (CAP), and it presents these systems as representing the actual DON ADP/IS management control system for the acquisition of ADP/IS. A case study in the actual operation of the DON system is also presented. The fourth part, Chapter VI, presents the conclusions and recommendations of the study.

II. A MANAGEMENT CONTROL FRAMEWORK

A. INTRODUCTION

This chapter presents a general discussion of planning and control systems and a more detailed discussion of management control systems. The purpose of this discussion is to provide a theoretical framework against which an existing DON management control system can be examined.

B. PLANNING AND CONTROL SYSTEMS

Planning and control are two of several functions or activities generally identified as being responsibilities of management. The knowledge of how management performs these planning and control functions within an organization is important. As Euske (1984, p. 17) points out,

> Planning is a key element in the process of an organization. Given the central role of planning, the manager can affect and change the organization by changing the planning system.

Emery (1969, p. 133) discusses planning as a process of describing desired behavior of and within an organization. The output of the planning process is normally a plan which "not only describes desired behavior, but . . . also serves as a formal vehicle for communication throughout the organization." Plans provide organizational stability, and they allow organizational subunits to formulate their own plans on the basis of an assumed or provisional level of activity within the organization.

> Upon approval, a plan becomes part of a network of plans that serves as the basis for execution and coordination. Any significant addition, deletion, or modification of a specific plan should be effected only through the same official approval mechanism that first authorized it. Failure to do this may rob the plan of its integrity and thwart the objectives of the original planner.

Anthony (1965), Emery (1969), and Euske (1984), all include control in their discussions of planning because as Euske clearly points out, "any good planning process has a control cycle" (1984, p. 19). Emery (1969) points out that a system of control is required in order for the plan to play a central role in the organization. The control system senses actual events, compares them with the approved plan, and signals the need for new planning if significant deviations occur. Emery identifies three important functions of a control system. The three functions are as follows:

(1) The control system encourages realistic planning and prevents it from becoming a "superficial exercise."

(2) The control system guards against excessive deviations from the approved plan which are likely to cause a breakdown in coordination.

(3) The control system provides feedback which can be used to improve the planning process.

The planning and control functions can be viewed as distinctly different, or they can be viewed as interacting in a systems context within an organization. Bozin (1981) identifies a number of theorists such as Fayol (1925), Koontz and O'Donnell (1955), and Mockler (1972) who approached the issue from the former perspective. Anthony (1965) has adopted the

latter viewpoint and has described a model which consists of several parts serving a common purpose: planning and control (Anthony, 1965).

Anthony (1965, p. 5) uses the plural "systems" in his discussion and explains that:

> The use of the plural--systems--for the total area signifies that in our view there are more than one planning and control systems in one organization.

He points out that the alternative to using the idea of multiple systems is to view planning and control as a single system with multiple parts. Either view can be used depending on the preference of the reader. On the use and function of planning and control systems, Anthony (1965, p. 6) writes:

> Planning and control systems are used to facilitate decision making. . . . The systems designer devises planning and control systems that will provide management with help in decision making and in the implementation or control of the decisions made.

Anthony's framework for planning and control systems uses three primary classifications for the planning and control processes (Anthony, 1965, pp. 16-18):

> Strategic planning is the process of deciding on objectives of the organization, on changes in these objectives, and on the policies that are to govern the acquisition, use, and disposition of resources.
>
> Management control is the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives.
>
> Operational control is the process of assuring that specific tasks are carried out effectively and efficiently.

Euske (1983) has written a succinct and enlightening discussion of planning and control using Anthony's framework.

This discussion was written as part of a chapter titled "Budgeting and Public Management," from Handbook on Public Budgeting and Financial Management, Jack Rabin and Thomas S. Lynch, eds., Marcel Dekker, Inc., 1983. His discussion is recommended to the reader who desires a more thorough review of the subject.

This thesis focuses on that portion of a planning and control system which is referred to above as management control.

C. MANAGEMENT CONTROL SYSTEMS

Anthony (1965, p. 32) pointed out that the lines between categories within his model of planning and control are blurred and noted that every situation does not fit perfectly into one of the three categories. Later, focusing on management control, he states that:

> Since the management control process takes place within the guidelines of specified objectives and policies, and since these vary from one organization to another, it is inconceivable that a single management control system ever can be developed that will fit all organizations.

Euske (1984, p. 6) argues convincingly that "there is no definitive model of management control." In view of this discussion, no attempt is made here to formulate an original management control model. What does follow is a discussion of some of the characteristics that Anthony attributes to management control systems and a review of the control process he attributes to those systems. The intent is twofold:

first, it is hoped that by focusing on some of these descriptive ideas and concepts, the reader might develop a better understanding of the concept of management control; and secondly, it is hoped that the understanding gained from the discussion will make the examination of an actual system against the theoretical framework more meaningful.

Anthony (1965, p. 17) points out that his definition of management control:

> . . . is intended to convey three key ideas. First, the process involves managers, that is, people who get things done by working with other people. Second, the process takes place within a context of objectives and policies that have been arrived at in the strategic planning process. Third, the criteria relevant for judging the actions taken in this process are effectiveness and efficiency.

The first idea, that management control involves managers appears to be a simplistic notion until it is understood that, within management control, managers are not only the party exercising control; they, and specifically their behavior, are also the object of that control. The management control process functions to "influence managers to take actions that will lead to desired results" (Anthony, 1965, p. 49). Managers are involved throughout a planning and control system, but only in the area of management control is management behavior the immediate object of concern.

> The central function of a management control system is motivation; the system should be designed in such a way that it assists and guides operating managers to make decisions and to act in ways that are consistent with the over-all objectives of the organization. (Anthony, 1965, p. 113)

Here, Anthony reinforces the notion that affecting management behavior is the objective of management control, and that it is management behavior during the decision making process that is of particular concern.

The second idea is important in attempting to explain a distinction between strategic planning and management control. As Anthony (1965, p. 31) explains,

> The planning and control process is in fact a continuum, and we imply a discrete dichotomy only because we believe that this is the best way to explain the distinction.

In the management control process, basic organizational objectives, structure, policies and guidelines are accepted as given. They are formulated in the strategic planning process. The management control process involves activities which are directed at ensuring that these given objectives are achieved as effectively and efficiently as possible within organizational and fiscal constraints (Anthony, 1965).

The third key idea Anthony conveys in his definition of management control is that of using effectiveness and efficiency as criteria for judging management control actions. Anthony (1965, p. 27) uses the following definitions of effectiveness and efficiency:

> "Effectiveness" is used here in Barnard's sense: "Effectiveness relates to the accomplishment of the cooperative purpose . . . . When a specific desired end is attained we shall say that the action is 'effective.'"
>
> "Efficiency," however, is used not in the sense of Barnard . . . , but rather in its more usual engineering sense: the optimum relationship between input and output. The more units of outputs are obtained from a

> given input, the more efficient is the machine or process.

The effectiveness and efficiency criteria are applied both to activities undertaken by management in the acquisition and use of resources and to the operation of the system of management control.

Another characteristic of the theoretical management control system is the degree of structure and the nature of the information in the system. Anthony states:

> The management control process tends to be rhythmic; it follows a definitive pattern and timetable, which are repeated. (1965, p. 37)

> Since the management control process encompasses the totality of the organization, management control systems, with rare exceptions, have an underlying financial structure; that is, plans and results are expressed in monetary units. (1965, p. 41)

The remainder of the chapter deals with how the control process within Anthony's framework is accomplished. According to Anthony, Dearden, and Bedford (1984), and Anthony and Young (1984), control can be defined as "guiding a set of variables (machines, people, equipment) toward an objective or goal;" and the authors relate that the control process implied in Anthony's definition of management control is accomplished in four steps, phases, or activities known as:

(1) Programming,

(2) Budget Formulation,

(3) Operating and Measurement, and

(4) Reporting and Evaluation.

Brief definitions or explanations of these terms are as follows:

Programming is making decisions

> . . . with respect to the major programs the organization plans to undertake during the coming period. These decisions either are made within the context of the strategies that have previously been decided upon, or they represent changes in strategy. If the latter, they are part of the strategic planning process, rather than the management control process; the two processes merge into one another in the programming phase. (Anthony and Young, 1984, p. 11)

Budget formulation is the translation of the approved program decisions

> . . . into terms that correspond to the sphere of responsibility of those who are charged with executing it. . . . The process of arriving at the budget is essentially one of negotiation between the managers of responsibility centers and their superiors. . . .
>
> The agreed-upon budget is a bilateral commitment. Responsibility center managers commit themselves to produce the planned output with the agreed amount of resources, and their superiors commit themselves to agreeing that such performance is satisfactory. Both commitments are subject to the qualification "unless circumstances change significantly." (Anthony and Young, 1984, pp. 11-12)

Operating and measurement is the process which occurs during the period of actual operations and involves maintaining records

> . . . of resources actually consumed, expressed in terms of costs, and of revenues actually earned. These records are so structured that cost and revenue data are classified both by programs and by responsibility centers. Data classified according to programs are used as a basis for future programming, and data classified by responsibility centers are used to measure the performance of responsibility center managers. For the latter purpose, data on actual results are reported in such a way that they can be readily compared with the plan as set forth in the budget. (Anthony, Dearden, and Bedford, 1984, p. 28)

Reporting and evaluation is the process in which

> Accounting information, along with a variety of other information, is summarized, analyzed, and reported to those who are responsible for knowing what is happening in the organization and who are charged with attaining the agreed-upon level of performance. . . . these reports essentially compare planned outputs and inputs with actual outputs and inputs. The information in these reports is used for three purposes.
>
> First, the reports are a basis for coordinating and controlling the current activities of an organization. . . .
>
> Second, the reports are used as a basis for evaluating operating performance. . . .
>
> Third, the reports are used as a basis for program evaluation. For any of a number of reasons, the plan under which the organization is working may turn out not to be optimum. If so, the budget or the program may need to be revised. (Anthony and Young, 1984, p. 12)

In the first part of this chapter, planning and control systems were discussed. Planning systems were said to result in plans. Control systems were said to perform three functions: (1) encouraging realistic planning; (2) guarding against excessive deviation from plans; and (3) providing feedback to the planning system. These planning and control functions appear to be carried out in the management control process described above. "Programming" and "budget formulation" primarily involve the development of plans. "Operating and measurement" and "reporting and evaluation" involve controlling planned activity and improving the approved plans by providing feedback to the planners.

D. SUMMARY

This chapter presented a framework for viewing planning and control and discussed one aspect of that framework--management

control--in detail. In that discussion, general characteristics attributed to management control or management control systems were identified, and the management control function was divided into four phases or aspects.

In the next chapter, the Department of the Navy (DON) acquisition system for automatic data processing and information system (ADP/IS) equipment components is described. The actual structure and process of the DON ADP/IS acquisition system are compared with the theoretical framework of management control previously described.

III. THE DON ADP/IS ACQUISITION PROCESS

A. GENERAL

A discussion of management control, a function performed by management within an organization's planning and control system, was presented in Chapter II. As discussed, the purpose of management control is to influence or to control management behavior during the decision making process in order to assure the effective and efficient acquisition and use of resources.

This chapter examines the Department of the Navy (DON) management control system used to control the acquisition of automatic data processing and information system (ADP/IS) equipment components. The DON ADP/IS acquisition process, as described in the DON directives, consists of two distinct but related systems. The first system is referred to as the Life Cycle Management (LCM) System. This system focuses on the decision to acquire ADP/IS as the method to be used to fulfill an identified mission need or requirement and on the management policies to be adhered to throughout the life of the ADP/IS. The second system is the DON computer acquisition program (CAP). The CAP focuses on the decision to allocate appropriated procurement (investment) funds to ADP/IS acquisition projects. The two systems do not exist independently, although the literature identifies and describes each separately.

They are interdependent, and in some instances, aspects of each system occur simultaneously. They are presented as separate systems for ease of discussion and examination against the theoretical framework presented in Chapter II.

The discussion of the ADP/IS acquisition process begins with an explanation of the term ADP/IS as it is used in this thesis. Secondly, the LCM system is described and examined against the theoretical framework of management control. The CAP is examined and compared to the theoretical framework of management control in Chapter IV.

B. DEFINITION OF ADP/IS

As discussed above, the acronym ADP/IS stands for Automatic Data Processing and Information Systems and is used in this thesis to refer to those components of an Information System (IS) acquired by the DON with CAP funds. CAP funds are funds appropriated by Congress in a single Automatic Data Processing Equipment line item within Budget Activity 7 (Personnel and Command Support Equipment) of the Other Procurement, Navy (OPN) appropriation. This budget line item is referred to as the Computer Acquisition Program (CAP). The purpose of the CAP is to "provide centralized funding for [the acquisition of] nontactical automatic data processing (ADP) equipment" (NAVCOMPT Manual, para 074361-8-g, p. 4-87) which meets NAVCOMPT criteria as investment cost items.

Information System (IS) is defined in Secretary of the Navy Instruction (SECNAVINST) 5231.1, "LIFE CYCLE MANAGEMENT

(LCM) POLICY AND APPROVAL REQUIREMENTS FOR INFORMATION SYSTEM (IS) PROJECTS," 08 March 1985, as follows:

> Information System (IS)--People, equipment, and facilities operating together in accordance with established procedures to collect, refine, combine, communicate, store, or retrieve information. (enclosure (2), p. 1)

The use of CAP funds is not limited to the acquisition of individual IS components as explained below.

> Hardware acquisitions (including peripherals) financed as procurement [by the CAP] include "turnkey" installations. The "turnkey" concept for the installation of equipment in real property facilities refers to installation wherein a single contractor provides equipment and its installation in a single contract citing a Procurement appropriation. Also financed [by the CAP] as investment costs are standard, existing executive software packages available with the purchase of ADP Equipment to be used without modification; integration of executive software with the equipment on a single contract to produce a usable end item; and proprietary software data bases. (NAVCOMPT Manual, para 075381-3-a, p. 5-151)

These "turnkey" installations are also included within the scope of the term ADP/IS as used in this thesis. In short, ADP/IS, as used within this thesis, is a component of an IS funded by the CAP.

C. DON ADP/IS LIFE CYCLE MANAGEMENT (LCM) SYSTEM

The DON ADP/IS LCM system is formally described in and implemented by SECNAVINST 5231.1B, "LIFE CYCLE MANAGEMENT (LCM) POLICY AND APPROVAL REQUIREMENTS FOR INFORMATION SYSTEMS," 08 March 1985. It is based on policies and strategies initiated by the Office of Management and Budget (OMB) for acquiring major systems by the executive department agencies. These

policies and strategies were published in OMB Circular A-109, "Major System Acquisitions," 05 April 1976. Subsequently, the Secretary of Defense issued policy and procedural guidance in compliance with A-109 in the form of Department of Defense Directive (DODD) 5000.1, "Major System Acquisitions," 29 March 1982, and Department of Defense Instruction (DODI) 5000.2, "Major System Acquisition Procedures," 08 March 1983. The Secretary of the Navy issued SECNAVINST 5000.1, "System Acquisition," 08 April 1983, to implement DODD 5000.1 and DODI 5000.2 within the DON and to give specific policy and procedural guidance for DON activities. SECNAVINST 5231.1B was issued to provide policy and procedural guidance specifically for Information Systems which includes ADP/IS as it is defined in paragraph B above.

In acquiring ADP/IS, DON management accepts the policies, strategies, and procedures as issued in the DOD and SECNAV directives noted above. In terms of the management control framework, these policies and strategies are outputs of the strategic planning process. The directives describe how the ADP/IS LCM system is to be structured (life cycle phases and milestones) and characterized (decentralized, competitive, efficient and effective), and the directives provide management with guidance (procedures, document formats) as to how management is to conduct itself when involved in the system acquisition process.

The ADP/IS LCM system is based on the concept that an ADP/IS system being acquired goes through a life cycle composed

of several phases. Decision points or decision milestones separate the phases in the life cycle, and approval at a milestone is required before beginning the next phase. The purpose of formalizing the LCM system through the issuance of instructions is to influence or control management behavior in the activities of the phases leading up to decision points and in the decision process itself by creating a standard management discipline (SECNAVINST 5231.1B, 1985).

D. LCM SYSTEM STRUCTURE

As noted earlier, the LCM system is based on the concept that acquisition projects progress through successive life cycle phases which are separated by decision milestones. How this structure is applied to individual ADP/IS projects depends on the classification of the project as a "major" or "other" category project. "Major" category acquisition projects are to be managed in accordance with the procedures prescribed in SECNAVINST 5000.1. "Other" category acquisition projects are to be managed in accordance with SECNAVINST 5231.1B. The basis for the classification is the level of authority required to approve the project at the decision milestones. The level of authority required is determined by a combination of the level of Congressional/DOD/DON interest in the system and the expected level of expenditures on a total project or an annual basis. Within the category of "other" acquisitions there are numerous sub-categories which are also determined

by a combination of the level of interest and expected level of expenditures. SECNAVINST 5231.1B provides more detailed guidance on determining the appropriate approval authority for a project and contains a matrix which facilitates this determination.

A formal, relatively uniform structure is established both for those projects categorized as "major" and for those projects in the upper layers of the "other" category. While the structure is relatively uniform and well-defined, the process is by no means simple. This formal structure and process are generally referred to as the Defense System Acquisition Review Council (DSARC) system. The DSARC system is documented in great detail in the DOD/DON acquisition directives and literature (DODD 5000.1, 1982; DODI 5000.2, 1983; SECNAVINST 5000.1, 1983; Handler, Hemmerle, and Rucker, 1985; and, Goral, 1979). The process involves as many as seventeen formal reviews including the milestone decision review and occurs within a structure of four formal life cycle phases which are separated by formal decision milestone reviews (Handler, Hemmerle, and Rucker, 1985). The life cycle phases and decision milestones are listed in Table III-1. A detailed explanation of the life cycle phases and decision milestones of the DSARC system as it exists within DON is presented by Handler, Hemmerle, and Rucker (1985) and is recommended for anyone who is involved with acquisition projects in the DON.

For acquisition projects in the "other" category, the structure and process to be applied are specified in enclosure

TABLE III-1

LCM PHASES AND DECISION MILESTONES

MAJOR SYSTEMS

PHASE	DECISION MILESTONE
Concept Exploration	
----------	I
Demonstration and Validation	
----------	II
Full Scale Development	
----------	III
Production and Deployment	

Source:

SECNAVINST 5000.1, 8 March 1983

(4) to SECNAVINST 5231.1B and in a supporting series of subordinate instructions. The most comprehensive of these supporting references are Naval Data Automation Command (NAVDAC) publication 24.1, "Project Management Plan," 09 March 1983, and NAVDAC publication 24.2, "System Decisions," 09 March 1983. The basic structure consists of five milestones and five life cycle phases. These milestones and phases are listed in Table III-2. Although the number of phases and milestones varies between the "major" and "other" categories, an examination of the implementing instructions reveals that the basic process of managing an acquisition project on a life cycle basis is followed for both categories. That one category has more or less phases with different names than does the other category appears to have only minor significance to the operation of the systems. More variation to the structure is permitted for "other" category projects. Based on the category of the project and other circumstances regarding the specific project, some of the life cycle phases may be significantly abbreviated in length or totally eliminated. Similarly, some of the milestones may be deleted. This is particularly true for projects in the lower sub-categories of the "other" classification (SECNAVINST 5231.1B, 1985).

For all categories, the timetable or schedule of phases and milestones is flexible (i.e., there are no specified or recommended lengths for the various phases, nor are there specific or recommended dates on which all milestones should

TABLE III-2

LCM PHASES AND DECISION MILESTONES

OTHER SYSTEMS

PHASE	DECISION MILESTONE
Mission Analysis and Project Initiation	
----------	0
Concept Development	
----------	I
Definition and Design	
----------	II
System Development	
----------	III
Deployment and Operation	
----------	IV*

*The milestone IV approval is an iterative decision continuing periodically throughout the deployment and operation phase.

Source:

SECNAVINST 5231.1B, 8 March 1985

occur). Lengths of phases and dates for milestones are to be tailored by management to the individual project (SECNAVINST 5000.1, 1983 ; SECNAVINST 5231.1B, 1985).

E. DOCUMENTATION REQUIREMENTS

The documentation required by the LCM system is specified in significant detail in the implementing instructions, therefore it is reasonably standardized. For both "major" and "other" category projects an initiating document is required which identifies the need and justifies the requirement for the ADP/IS in terms of the activity's mission. For "major" projects this initiating document is called a Justification for Major System New Start (JMSNS). For the "other" projects, the document is called a Mission Element Need Statement (MENS). Formats for both documents are standardized by the implementing instructions (SECNAVINST 5000.1, 1983; SECNAVINST 5231.1B, 1985).

After the initial approval of the project has been granted, the acquisition project manager develops a comprehensive planning document called a project management plan (PMP) (NAVDAC pub 24.1, 1983). Handler, Hemmerle, and Rucker (1985) refer to this plan as the "acquisition strategy." Regardless of its name, this document represents the overall management plan for the acquisition project, and the document identifies and discusses all major concerns of the project. These include the performance, schedule, financial, and logistical aspects of the project. This document, like the system structure and timetable, should be tailored to the particular project.

Specifics related to the data content and preparation of the document are contained in NAVDAC pub 24.1, 1983.

At each decision milestone a standardized document called a System Decision Paper (SDP) is required to document the status of the project for the formal review and decision process. If approved, the SDP serves as the basis for updating the PMP. The degree of detail of the information presented varies according to the category or sub-category of the project and the life cycle phase being completed. NAVDAC pubs 24.1 and 24.2 provide the detailed data requirements for the SDPs. In brief, each SDP summarizes past activity or performance; analyzes variances in performance, cost, and schedule from the last SDP; updates schedules; provides forecasts for the next phase; and justifies continuance of the project in terms of mission need (NAVDAC pub 24.2, "System Decisions," 1983). The PMP and SDP are discussed further in the LCM CONTROL PROCESS section presented below.

In terms of the theoretical management control framework the structure of the LCM system has a definite basic pattern (e.g., life cycle phase, milestone, life cycle phase, milestone). However, because the basic pattern and its companion timetable can be tailored to unique situations; and because each life cycle phase involves substantially different types of activities and occurs only once; the system, especially during the early phases of an acquisition project, does not exhibit the rhythmic characteristic described by Anthony in

the theoretical framework. Also, as is discussed in the next section, the basic nature of the control process does not appear to be financial, as Anthony suggested it would be for most systems.

F. LCM CONTROL PROCESS

A majority of the major system acquisition management objectives as stated in OMB Circular A-109 are related to costs. Project cost is established as a design criterion, and performance characteristics and schedules are to be established or modified only in view of proper trade-offs with cost (SECNAVINST 5000.1, 1983). As indicated in the directives, financial status reports are key inputs to each decision milestone as part of the SDP (NAVDAC pub 24.1, 1983). As a result of this guidance and if the assumption that there is a scarcity of financial resources generally available to most ADP/IS acquisition projects is accepted, then it could be argued that financial data is the general basis for control in the LCM system.

However, it is noted that in the LCM system, the priority of the mission area or the urgency of need involved may cause financial data to be less significant to the control of the project than schedule and/or performance data (SECNAVINST 5000.1, 1983; and, Handler, Hemmerle, and Rucker, 1985). Therefore, unlike the theoretical framework of a management control system, the basic nature of the control process within the LCM system appears not to be financial, but instead,

appears to be the synthesis of several concerns which are integrated into the overall acquisition plan mentioned earlier, the PMP. The basis for control appears to be how well all of these concerns can be engineered into a system which effectively and efficiently satisfies the identified mission need. Thus, although the basis of control in the LCM system is somewhat different from that of the theoretical system, the objectives of the two systems are very similar.

The major controlling mechanism for the acquisition project appears to be the initial development and subsequent iterative revision of the acquisition strategy document concurrent with the preparation and review of the SDP. The strategy document addresses all of the primary concerns facing the acquisition project manager. These concerns include effectiveness of the proposed system in fulfilling the identified mission need, the relative efficiency of the proposed ADP/IS as compared to other alternatives, the required deployment schedule, testing programs, capital expenditure plans (CAP fund requirements), operating budgets, and personnel requirements. The project manager documents the status of each of these concerns in the SDP at the decision milestone or when required by the approval authority. These data are reviewed by the approval authority and approved before the project moves to the next life cycle phase.

G. LCM CONTROL PROCESS ACTIVITIES

The control process activities of "programming," "budget formulation," "operating and measurement," and "reporting

and evaluation" attributed by Anthony and Young (1984) and Anthony, Dearden, and Bedford (1984) to the theoretical management control system appear to be closely paralleled by the activities within the control process of the ADP/IS LCM system.

1. Programming

There are several functional elements or programs which are performed in the course of an ADP/IS acquisition project. How these functional elements are to be performed is to be documented (planned) in a series of functional plans which are then included as part of the PMP. These plans may include some or all of the following depending on the size of the acquisition project:

- a test and evaluation master plan which describes the types and methods of test and evaluation to be used for both hardware and software components;
- an acquisition plan which identifies specific components to be purchased, dates the components are required, and the funding required (this "acquisition plan" should not be confused with the acquisition strategy document mentioned earlier which is the comprehensive planning document for the entire project);
- a configuration management plan;
- an integrated logistics support plan; and
- a training plan.

Detailed descriptions of these functional plans and others can be found in NAVDAC publication 24.1, "Project Management Plan," 1983.

Programming decisions in the LCM system involve the selection of the pertinent plans to be used, the development

of strategies to be followed in executing the plans, and the identification and allocation of resources required by each functional element. The identification and allocation of resources are projected across all of the life cycle phases and are documented in the PMP. The projections are subsequently reviewed and updated at each decision milestone. One specific type of resource that is programmed in this manner is the CAP investment funding resource.

A weakness in the LCM control process involves the approval of programming decisions for funding resources. There is a potential that LCM funding decisions may not be appropriately transmitted to the DON fiscal resource management system--the Planning, Programming, and Budgeting System (PPBS) of which the CAP is a part.

Funding or fiscal resources are controlled through the operation of the Planning, Programming, and Budgeting System (PPBS) (DODI 7045.7, 1984; SECNAVINST 5000.1, 1983; SECNAVINST 5231.1B, 1985). The CAP exists within the PPBS and exercises control over the granting and use of funds for the acquisition of ADP/IS. The CAP and the PPBS are discussed in Chapter IV.

LCM system decisions which involve a requirement for funding resources must be transmitted to the PPBS/CAP by means of some interface. The DOD and DON directives make clear that the interface between the two systems is management. Functional managers, resource managers, and particularly acquisition project managers are tasked with ensuring that the

two systems operate in a coordinated fashion (DODD 5000.1, 1982; DODI 5000.2, 1983; SECNAVINST 5000.1, 1983; and SECNAVINST 5231.1B, 1985). If the interface (e.g., management) is not effective in transmitting the LCM funding requirement to the PPBS/CAP system, then the acquisition project is interrupted or terminated. The interface is not automatic. There is no mechanism which is activated by the LCM decision to enter the LCM requirement into the PPBS/CAP system. Only in the case of the LCM decision to approve the initiation of a "major" category project are fiscal resources simultaneously identified in the PPBS/CAP system. This simultaneous identification of funds is accomplished by having the LCM decision designated by the directives as a PPBS/CAP decision. The approval of all other LCM programming decisions involving funding requirements must be submitted as an input to the CAP system decision process. As noted by Nelson and Balaban (1984), this creates a degree of uncertainty or instability in an acquisition project as the availability of project funding is seldom guaranteed.

2. Budget Formulation

Budgets are formulated by functional elements within the ADP/IS project based on the approved programming decisions (i.e., the approved programming decisions are translated into functional budgets for the next operating period). This is in consensus with the theoretical process. However, LCM budgets for CAP funds are subject to the same review by the CAP system as the programming decisions are. The budget is

formulated and tentatively approved within the LCM system, but it cannot be executed without final approval within the CAP system. The same potential failure of the management interface between the two systems exists for budgeting as it did for programming. The situation is further complicated in that the initial approval decision in the LCM system may be made several months to a year before a a final decision is reached in the CAP system. The assumptions with regard to workload, equipment availability, and operating costs, used in making programming and budgeting decisions may change as conditions change over time. If significant changes do occur, then the programming and budgeting decisions made in the two systems (LCM and CAP) with regard to the same project but separated over a long period of time may not be reconcilable. Again, no guarantee exists that LCM decisions will be supported in the CAP system.

3. Operating, Measurement, Reporting and Evaluation

As mentioned earlier, operating data from the preceding life cycle phase are inputs to each decision milestone. Variances from the approved PMP are reviewed for causal factors, plans are adjusted, and new forecasts are made. In keeping with the overall strategies of decentralization and project tailoring, the method of collecting the required data varies with each project and therefore should be detailed in the management information system plan section of the acquisition strategy or project management plan. Reporting and evaluation

are performed at the decision milestones as discussed earlier. This process of data collection, reporting, evaluation, and adjustment of plans is very similar to the control process activities of the theoretical management control system.

H. EFFICIENCY AND EFFECTIVENESS CRITERIA

The DOD and DON instructions make clear that efficiency and effectiveness are criteria by which the LCM system is to be judged. The efficient and effective acquisition of ADP/IS is among the principal goals of the DON ADP/IS LCM system. The two terms are used throughout the instructions. In every life cycle phase leading up to the deployment of the ADP/IS, management is required to conduct economic analyses not only to demonstrate that project benefits exceed costs, but also to demonstrate the economic efficiency of the proposed ADP/IS relative to alternate solutions to the mission need (SECNAVINST 5231.1B, 1985). The use of efficiency and effectiveness as decision criteria is very similar to Anthony's use of the terms in his definition of a management control system. However, a difference exists between the theoretical control system and the LCM system involving the scope of the meanings of the terms 'resources,' 'effectiveness,' and 'efficiency.' Anthony speaks of resources in a general sense, all types of resources across the entire organization; whereas the ADP/IS LCM system tends to focus on a specific resource (ADP/IS) to be used to satisfy a specific need. The need for an ADP/IS resource is

identified in a Mission Element Needs Statement (MENS) or a Justification for Major System New Start (JMSNS). The MENS/JMSNS discusses the need for the resource in terms of the requesting activity's mission. The MENS does not address other types of resource needs within the requesting activity, nor does it address the resource needs of other activities within the organization as a whole. As a result of this narrow focus on a specific resource, the scope of the terms efficiency and effectiveness within the LCM system is also limited.

In the ADP/IS LCM system, effectiveness and efficiency can only be used to describe how resources are applied relative to a specific need, and not in terms of how they are used relative to the organization as a whole. Effectiveness is limited to the degree to which a specific need is satisfied. The LCM system does not address the issue of relative priority of that need within the organization as a whole or to what degree broad organizational objectives are achieved by the application of the resource. Efficiency is similarly limited in perspective to a specific need and does not apply to the broader perspective of the organization as a whole. The concept of efficient and effective use of resources within the organization as a whole and the concept of relative priority of competing needs within the organization are, however, addressed within the CAP system as is discussed in Chapter IV.

I. SUMMARY

This chapter introduced the idea that the management control system for the DON ADP/IS acquisition process consists of two parts; the LCM system, and the CAP system. ADP/IS was defined as components of an IS which are funded in the CAP. The ADP/IS LCM system was described and discussed in terms of the theoretical framework of management control presented in Chapter II.

The most notable difference between the actual DON system and the theoretical framework appears to involve the meaning of the term "resources." The ADP/IS LCM system is limited to dealing with ADP/IS resources only. The theoretical system deals with all types of resources across the organization as a whole. This difference limits the meaning of the terms "efficiency" and "effectiveness" in describing the acquisition and use of resources. The difference was also noted in the programming and budget formulation portions of the LCM control process. Decisions made in these two areas must be confirmed by the CAP system (which considers all types of resources) before they can be considered as final decisions authorizing execution of plans.

The next chapter describes and examines the second part of the DON ADP/IS acquisition control system, the CAP system. The actual control system structure and process are described and discussed in terms of the theoretical framework of management control presented in Chapter II.

IV. THE DON CAP

A. GENERAL

A discussion of the DON ADP/IS acquisition process was begun in Chapter III. The process is being described as if it consisted of two distinct systems. The first, referred to as the LCM system, was described in Chapter III. The second system, which is referred to as the 'CAP,' is the system used within the DON to provide the investment funds for the DON Computer Acquisition Program (CAP).

In this chapter the CAP is described and discussed in terms of the theoretical framework of management control presented in Chapter II. The discussion begins with a description of the CAP fund and its purpose. Next a brief description of the DOD/DON Planning, Programming, and Budgeting System (PPBS) is presented. A more detailed discussion of the programming and budgeting phases of the PPBS as they relate to the CAP follows that description. As was done with the LCM system, strengths and weaknesses of the actual system are pointed out as the system is examined, and they are summarized in Chapter VI.

B. CAP FUND DEFINITION

The CAP fund is defined in Volume 7 of the NAVCOMPT Manual and refers to those funds appropriated in the Automatic Data Processing Equipment (ADPE) line item within Budget Activity 7

(Personnel and Command Support Equipment) of the Other Procurement, Navy (OPN) appropriation. These are investment funds for the acquisition of non-tactical ADP/IS equipment components, as defined in Chapter III, which meets NAVCOMPT criteria as investment cost items. The CAP fund is to be used by activities that are not funded by an industrial fund or by the Research, Development, Test and Evaluation, Navy (RDT&EN) appropriation. Paragraph 074361-8-g of the NAVCOMPT Manual describes the ADPE line item of the OPN appropriation as follows:

> This activity provides centralized funding for non-tactical automatic data processing (ADP) equipment. The Commander, Naval Data Automation Command is the Financial Manager for the Computer Acquisition Program (CAP).

Tactical or embedded computer systems are specifically excluded from funding under this appropriation line item as discussed in paragraph 075372 of the NAVCOMPT Manual. They are funded by other procurement appropriations. Funds for the operation of an ADP system once the system is deployed or is in place are budgeted for by the host activity in its normal operation account(s).

C. INTRODUCTION TO THE PPBS

The DON CAP functions within the DOD Planning, Programming, and Budgeting System (PPBS). The PPBS is used by the DOD and the DON as a means of participating in the overall federal budget process. (The federal budget process is described in

substantial detail in the Practical Comptrollership Course (PCC) Text (1983) and several other references.)

The Planning, Programming, and Budgeting System (PPBS) is described as follows in the implementing instruction, Department of Defense (DOD) Instruction 7045.7, "Planning, Programming, and Budgeting System (PPBS)," 23 May 1984: "a cyclic process containing three distinct but interrelated phases: planning, programming, and budgeting." The purpose of the process is "to produce a plan, a program, and finally, a budget for the Department of Defense." A new PPBS cycle is started each year and lasts approximately three years; therefore, three cycles operate simultaneously within the system.

D. THE FYDP

The document or database used to record PPBS decisions (as modified by legislation or Secretary of Defense direction) is the Five Year Defense Plan (FYDP). The FYDP has a two-dimensional structure which facilitates the display of resource requirements by FYDP programs (mission areas) and/or by appropriations. The DOD and its components plan and identify resource requirements in terms of mission responsibilities (i.e., what resources are required to provide a strategic deterrent force). The 10 FYDP programs are listed in Table IV-1. Congress, however, considers resource requirements by type (i.e., manpower, procurement, construction) and enacts

TABLE IV-1

FYDP PROGRAMS

1	STRATEGIC FORCES
2	GENERAL PURPOSE FORCES
3	INTELLIGENCE & COMMUNICATIONS
4	AIRLIFT & SEALIFT
5	GUARD & RESERVE
6	RESEARCH & DEVELOPMENT
7	CENTRAL SUPPLY & MAINTENANCE
8	TRAINING, MEDICAL & OTHER SUPPORT
9	ADMINISTRATION & ASSOCIATED ACTIVITIES
0	SUPPORT OF OTHER NATIONS

Source: Director, Department of the Navy Program Information Center (DONPIC)
PLANNING, PROGRAMMING AND BUDGETING SYSTEM (PPBS) COURSE

appropriation bills by type of resource required. The FYDP's two-dimensional structure supports the recording of resource requirements in both formats (mission and appropriation).

The DON uses a similarly structured database for conducting its activities in support of the PPBS. Within the DON database, resources can also be identified to a resource sponsor and a major claimant (resource sponsors and major claimants are discussed below in the programming phase of the PPBS). In some cases, the DON database will also identify the specific users and/or the uses of the resources (i.e., the Shipboard Non-tactical Automated Data Processing (SNAP) project or the Naval Supply Systems Command Inventory Control Point Resolicitation project).

Both databases contain data for prior, current, budget, program, and out-years. The databases convert all resource requirements to fiscal terms (dollars) and is structured to facilitate the aggregation, comparison, analysis, and allocation of total resource requirements regardless of the nature of the resource. The databases integrate the programming structure (mission oriented) and the assignment of responsibilities for those missions (resource sponsors) with the budget (appropriation) structure and the associated accountability of the budget holders (claimants) for budget execution. As a result, total resource requirements, allocations, and use across the totality of the DOD and DON organizations are contained within the FYDP and the DON database structures

respectively. A more detailed description of the FYDP can be found in DODI 7045.7 (encl 5) and in DODI 7045.7-H, "FYDP PROGRAM STRUCTURE HANDBOOK," 23 May 1984. The DON Programming Manual and NAVCOMPTINST 7100.45, "FIVE YEAR DEFENSE PROGRAM (FYDP)," 10 November 1982, describe the Navy database.

In terms of the theoretical management control system, the PPBS and the FYDP, of which the CAP is a part, represent a system of resource acquisition and use which encompasses all organizational resource requirements across the totality of the organization. Further, it is a system which is basically financial in nature.

E. PPBS PLANNING

The planning phase of the PPBS generates "defense policy, strategy, force planning, resource planning and fiscal guidance" to be followed in the programming and budgeting phases. The focus in the planning phase is on broad issues and objectives such as:

> defining the national military strategy necessary to help maintain U.S. national security . . .; planning the integrated and balanced military forces necessary to accomplish that strategy; [and] assuring the necessary framework (including priorities) to manage DOD resources effectively for successful mission accomplishment consistent with national resource limitations; . . . (DODI 7045.7, 1984, p. 3)

The planning phase of the PPBS appears to correspond with the strategic planning category within the theoretical framework of planning and control in terms of the types of activities and the outputs or end products of those activities. For

example, high level leadership reviews the current status of the organization and analyzes its environment both present and future. Based on these analyses, broad organizational goals are established, policies and strategies for attaining those goals are developed, and broad fiscal guidelines (constraints) are issued. The planning phase of the PPBS differs from the theoretical concept in that DOD initiates these planning activities on an annual schedule. Anthony suggested that strategic planning would occur in a more irregular fashion. Anthony and Herzlinger (1975), writing after PPBS had been abandoned by the federal government (except for the DOD), stated that the only planning performed in the PPBS was in the form of programming and budgeting. However, they attributed the failure of PPBS in the federal government to faulty implementation and not to the lack of a planning function (1975, p. 223).

The PPBS has continued to evolve within the DOD, and DOD directives continue to include planning as a function separate from programming and budgeting. Whether or not the planning function in the current PPBS is in fact equivalent to the theoretical concept of strategic planning is an area that might be examined in a future study.

F. DON PROGRAMMING

The planning forces, the fiscal guidance, and the constraints originated in the planning phase of PPBS are translated into warfare and support programs during the programming phase. In the DON this programming function is performed by

the Office of the Chief of Naval Operations (OPNAV) resource sponsors under the direction of the Program Planning Office (OPNAV-090). These warfare and support 'programs' are the means to achieve DON mission goals. The OPNAV resource sponsors build the programs by identifying resource requirements within their area of responsibility and including those resources in a resource proposal or plan. They identify both the use and the user of the resources. The users are referred to as the major claimants of the resources, and they are the organizations responsible for executing the programs once the identified (planned) resources are made available by Congress. Examples of major claimants are the Fleet Commanders and Commanders of organizations such as the Naval Military Personnel Command, the Naval Sea Systems Command, and the Naval Space Warfare Command. The DON resource sponsors and their respective areas of responsibility are listed in Table IV-2.

The programming phase generally begins in August with the issuance of programming guidance by SECNAV, CNO, and OPNAV-090. This guidance is in the form of economic assumptions, identification of missions for particular emphasis, and/or fiscal constraints to be adhered to by the resource sponsors. From January until approximately April the resource sponsors consolidate and reconcile the various program inputs (requirements as well as constraints) they have received in the programming guidance and from the major claimants. These new data are also reconciled with the data already residing

TABLE IV-2

DON RESOURCE SPONSORS

WARFARE PROGRAMS

SPONSOR	PROGRAM RESPONSIBILITY
OPNAV--02	SUBMARINE WARFARE
OPNAV--03	SURFACE WARFARE
OPNAV--05	AVIATION WARFARE

SUPPORT PROGRAMS

SPONSOR	PROGRAM RESPONSIBILITY
OPNAV--01	MANPOWER, PERSONNEL, TRAINING
OPNAV--04	LOGISTICS
OPNAV--095	UNDERSEA SURVEILLANCE/OCEANOGRAPH
OPNAV--093	MEDICAL
OPNAV--009	INTELLIGENCE
OPNAV--098	RESEARCH AND DEVELOPMENT
OPNAV--094	COMMAND, CONTROL, COMMUNICATIONS
OPNAV--09B	COMMAND/ADMINISTRATION
OPNAV--06	MILITARY ASSISTANCE
OPNAV--06	PLANS, POLICY, OPERATIONS

Source:

Director, Department of the Navy Program Information Center (DONPIC)
PLANNING, PROGRAMMING AND BUDGETING SYSTEM (PPBS) COURSE

in the database as a result of prior year decisions. The iterative review of prior year program decisions ensures that those decisions remain valid in relation to current constraints and assumptions. The process results in a Sponsor Program Proposal (SPP) which is the sponsor's resource plan to support the assigned area of responsibility during a particular year.

These SPPs are then reviewed individually and collectively by OPNAV-090 in April and May in what is referred to as the 'end-game' or 'program roll-up' to ensure that the SPPs conform to current program guidance and overall fiscal constraints. The output of the end-game is the DON Program Objectives Memorandum (DON POM). The DON POM is reviewed, adjusted, and ultimately approved by the CNO after which it is submitted as the DON input to the DOD programming process where still further reviews and adjustments will be made.

The programming phase of the DON PPBS appears to be very nearly identical to the theoretical programming process described by Anthony (1965). The process moves successively through the five principal steps in a formal programming system described by Anthony and Young (1984). It is initiated by the preparation and dissemination of guidelines; includes preparation and analysis of program proposals; involves discussion and consultation with the parties responsible for program execution; and concludes with review and final approval by higher authority.

G. DON BUDGETING

The budget process normally begins in June or July approximately 15 months prior to the start of the fiscal year being considered. Budgeting responsibilities and procedures are contained in the "DON Budget Guidance Manual," NAVCOMPTINST 7102.2, 1983. Budgets are developed in a format similar to the appropriation structure using the DON POM totals as initial control or target figures. Additional budget guidance similar to the programming guidance is generally issued by the DON leadership. Initial budget proposals are developed by the major claimants and presented to the appropriation sponsors. The appropriation sponsors coordinate and consolidate the budget proposals of the major claimants into an overall resource requirement or budget estimate. The appropriation sponsors are responsible for developing this estimate within existing general program and fiscal guidelines as well as within specific budget guidelines that may exist as mentioned above.

The budget proposals are generally based on approved programs already existing in the database and on LCM system milestone decision inputs which were dicussed in Chapter III. The budget proposals generally represent the most current pricing of the resource requirements. The system was designed to have the flexibility to consider new requirements during the budget deliberations through a process called reprogramming which involves the shifting of resources

previously designated (programmed) for one use to new or other uses. Reprogramming is done with the concurrence of the resource sponsor, the major claimant, and the appropriation sponsor. The formats for budget requests (including reprogramming requests) and required supporting documentation are described in NAVCOMPTINST 7102.2, "DON Budget Guidance Manual," 27 April 1983, and in directives issued by the appropriation sponsors.

The DON budget is the aggregation of all DON appropriation estimates. The DON budget is submitted to DOD in September, and the DOD budget is submitted to the Office of Management and Budget (OMB) in October. The DOD budget is included as a part of the President's Budget which is submitted to Congress in January or February. After legislative consideration and adjustment, a budget is authorized and then funds are appropriated. Appropriations are apportioned by OMB to DOD and by DOD to DON. Execution of the budget begins on 01 October some two years or more after the initial programming guidance was issued and at least one year after initial appropriation sponsor budget decisions were made.

H. CAP PROGRAMMING AND BUDGET FORMULATION

The CAP exists within the structure of the PPBS and follows the PPBS cyclic timetable in providing funds for the acquisition of non-tactical ADP/IS. The initial identification of specific resources as part of the CAP takes place during the DON programming phase. The resource requirements are identified

and entered into the database using DON program elements which identify the resource sponsor, the FYDP program, the claimant, the appropriation, and the proposed use of resources. However, small dollar value of CAP items can be consolidated within a single CAP entry or consolidated with other support requirements in general support category entries. In this way CAP resources can lose their unique identification to a specific project within the DON POM totals. Therefore, if the total CAP resource is reduced during a subsequent review, then the respective resource sponsor normally must identify the specific requirement that must be reduced, eliminated, or possibly reprogrammed into a following year.

At this point it is important to remember that CAP funds are investment funds rather than operating funds. If the LCM system requirements for extensive economic analyses of individual acquisition project proposals is rigorously enforced, then it is reasonable to consider the resulting CAP fund requirements as minimum discrete funding increments necessary to carry out the acquisition. This requirement for funding in discrete increments is in contrast to the requirement for operating funds which tends to be of a continuous nature. This incremental nature of the CAP fund requirements makes the adjustment of requirements more difficult as the adjustment decision in many cases becomes an all or nothing decision.

The management structure of the CAP resides primarily within OPNAV. CAP resources may be programmed by any of the

OPNAV resource sponsors at the request of any major claimant. The OPN appropriation sponsor is OPNAV-92, the Fiscal Management Division. The CAP resources which have been programmed are translated into a single line item CAP budget by the Investment and Development Division (OPNAV-922/NCB2) through the consideration of budget request proposals made by the major claimants. Commander, Naval Data Automation Command (NAVDAC), as the CAP financial manager and as the Navy technical authority on ADP/IS, provides technical and staff assistance to OPNAV-922 during the budget process. Although CAP funds are approved in the basis of individual acquisition projects, these individual projects are not individually identifiable in the DON budget. As mentioned earlier, the CAP is expressed as a single line item when it is submitted as part of the total DON budget. Major ADP/IS projects may be identified in supporting documents if required during subsequent reviews.

The DON CAP budget formulation process resembles the budget formulation process described by Anthony and Young (1984) in a number of ways. As was the case for the theoretical system described by Anthony and Young, the budget formulation process in the CAP/PPBS "is a fine tuning of the program for a given year" and the "decisions are . . . made within the context of the basic decisions that were made during the programming process." Additionally, the CAP/PPBS budget process affixes responsibility for program execution to responsibility centers (major claimants) and in this manner,

provides a basis for control of responsibility center managers.

I. CAP BUDGET EXECUTION

Funds actually appropriated in the CAP and apportioned to the DON are centrally administered within OPNAV. As already mentioned, the OPN appropriation sponsor is OPNAV-92. NAVCOMPT receives OPN funds from DOD and passes the CAP portion to OPNAV-923, the administering office, who must account for the obligation and expenditure of the funds. OPNAV-923 then forwards the CAP funds to NAVDAC who, as the financial manager of the CAP, allots the funds to the major claimants on the basis of the approved CAP budget estimates. The responsibility for execution of the budget lies with the claimants and with NAVDAC. The claimants must submit contractual documents for LCM approved projects to NAVDAC in order to claim funds approved in the CAP programming and budgeting process. NAVDAC, and not the claimants, has fiduciary responsibility for the total CAP budget. NAVDAC monitors the total CAP budget by reviewing each request to ensure that proper LCM and PPBS/CAP approvals have been granted prior to making a fund citation on the contractual document. NAVDAC also advises the appropriation sponsor of deviations in spending from what was planned and makes recommendations to the appropriation sponsor relative to the reapplication of CAP assets to other ADP/IS projects (NAVCOMPT Manual, para 075371).

As discussed below, difficulties are encountered in allotting funds to all approved claimant projects if the appropriation or the apportionment of the appropriation is less than the approved budget estimate. The specific problem is who gets the funds and who goes unfunded?

J. EFFECTIVENESS AND EFFICIENCY

Anthony (1965) indicated that the effective and efficient acquisition and use of resources in the accomplishment of organizational objectives was a key idea in his definition of management control. The PPBS/CAP process tends to ensure that the allocation of resources to the CAP is an effective and efficient use of resources within the total DON organization by creating a series of decision points or reviews at which critical consideration is given to the use of the resources. The initial resource allocation is to the various resource sponsors and is based on the program/mission priorities within the DON. Secondly, the resource sponsor includes CAP requirements in its SPP only if it is demonstrated that the use of the resources contributes to the accomplishment of a program objective (i.e., that it is an effective use of the resources).

Allocation is also based upon a competition for resources within programs. Because total resources available to the resource sponsors are constrained, the resource sponsors, in considering proposed projects, tend to select those projects that, based upon their judgment, will collectively result in

the greatest overall contribution to mission goals. In other words, the sponsors attempt to maximize the attainment of mission objectives while constrained to a given level of resources. CAP requirements compete against other types of requirements (i.e., manpower, weapons, construction) for inclusion in the programs of the sponsors. These types of decisions are made repeatedly throughout the iterative programming cycle. This programming process tends to result in an overall efficient use of resources.

Although the focus in the budgeting phase changes from a program perspective to an appropriation one, the tendency to an overall efficient use of resources is preserved. Only those CAP resources contained in the approved DON POM for LCM approved projects are included in the appropriation budget estimate.

K. CAP WEAKNESSES

Two weaknesses are noted in the DON CAP programming and budget process. The first involves the uncertainty associated with LCM system funding decisions, and the second is the absence of a formal decision mechanism for adjusting the CAP budget estimate to a lesser apportionment funding level.

Although the control concepts of programming and budgeting discussed above appear to be simple, the actual PPBS/CAP process is complex. The complexity of the process increases the degree of uncertainty already associated with funding

decisions for individual ADP/IS projects as discussed in Chapter III.

The PPBS/CAP process is complex in that it is composed of several phases. Each phase involves many different echelons of review and approval. The phases are cyclic and occur over a long period of time. The phases can and do overlap. This overlap appears to add to the complexity of the process. Part of the complexity of the process resulting from the multiple overlapping phases is that while the decisions made in the programming phase are still being reviewed and adjusted, initial budget decisions are being made. Any adjustments to POM submissions must be factored into budget decisions, possibly after the initial budget decision has been made. Another part of the complexity of the prcess is the fact that appropriation line item totals are not assured until appropriated by Congress and apportioned by OMB and DOD. Total allotments cannot be made and the budget fully executed until these apportionment line item totals are known. Both programming and budget adjustments may be made in the form of reductions in the total CAP line item without reference to any individual acquisition projects.

Yet another part of the complexity of the process is that if the appropriation or the apportionment of that appropriation is less than the approved budget estimate, then some adjustment to the composition of projects which makes up the budget estimate must be made before all allotments can be

made. The tendency for CAP resource requirements to be in discrete increments increases the difficulty in making the adjustments as some projects may become totally unfunded after having successfully competed for resources throughout the programming and budgeting phases over as much as a two year period. This situation may be aggravated by the fact that it is possible that neither the resource sponsor, the claimant, nor the project manager has continuous visibility of the individual project in the system database throughout the process. A manager may not know that the CAP funding has been deleted or delayed. Project instability and management frustration can result from involvement in this complex process.

A specific weakness noted in the system is that there is no formal procedure for adjusting the approved CAP budget estimate to conform to a lesser apportionment. Until such time as the funds are apportioned, the system provides a relatively formal method for reacting to resource adjustments. The method involves direct negotiation and reclama proceedings between the approval authority and the resource user. The approval authority uses both individual project and aggregate resource effectiveness and efficiency as decision criteria in selecting projects to be funded. This method provides management with flexibility in the application of resources to varying mission need priorities and supports the tendency towards an effective and efficient overall use of resources. Given that the CAP budget estimate will undergo numerous reviews

prior to appropriation and apportionment of funds, management should anticipate that changes will be made to the original estimate. Anthony and Young discuss the desirability of having a well understood mechanism in place for adjusting a budget to the "realities of the situation." As they point out, without adjustment the budget will "not serve as a reliable plan against which actual performance can be measured" (1984, p. 435). There appears to be no such formal mechanism in place for the CAP. In order to preserve the flexibility, effectiveness, and efficiency in the use of resources, a formal decision mechanism involving resource planners and users should be used in deciding upon the final allotment of the apportioned CAP line item.

L. SUMMARY

This chapter presented a discussion of the DON CAP as it operates within the PPBS to provide funding for the acquisition of ADP/IS. The actual system exhibits many of the characteristics of the theoretical management control system described by Anthony. The CAP involves management making decisions regarding the acquisition and use of resources for the purpose of accomplishing organizational goals. The CAP exists within the policies and constraints established by the highest levels of DOD/DON management for the acquisition of resources. The CAP encompasses the totality of the organization in what is primarily a financial structure. That structure is represented by the FYDP. The FYDP integrates

the responsibilities and activities of a programming function with those of a budgeting function; and it provides the basis for the recording, measurement, and evaluation of activitives in support of both functions. The control process is cyclical, iterative, and is composed of successive programming, budgeting, and budget execution phases. A general weakness noted in the system was the complexity of the control process which leads to increased uncertainties. A specific weakness noted in the system was its lack of a formal decision mechanism for adjusting the CAP budget estimate given a lesser CAP apportionment.

Chapter V presents a case study in the actual operation of the DON ADP/IS acquisition control system.

V. TRIDENT LOGISTICS DATA SYSTEM (LDS)

A. INTRODUCTION TO TRIDENT LDS

> The TRIDENT LDS is a major Automated Information System (AIS) developed to support the Ohio Class submarine in its acquisition, transition (fitting out) and operational phases. The LDS is composed of software systems, both Navy-standard and TRIDENT-unique; a hardware suite with elements in multiple locations; and data communications links between locations.

The above description of the TRIDENT LDS is taken from revision 2 of "The TRIDENT LOGISTIC DATA SYSTEM Historical Development, Current Status and Future Initiatives," dated March 1985. The document, prepared by the Strategic Systems Program Office (SSPO), Washington, DC, is included as an appendix to this thesis to provide the reader with background information on the TRIDENT submarine program and the development of the TRIDENT LDS.

B. GENERAL

The remainder of this chapter presents a case study in the DON ADP/IS acquisition and funding approval process. The case is the replacement of the TRIDENT LDS hardware suite located at the Bangor, Washington production site. The actual events related to the acquisition and funding approval process are presented in chronological sequence as documented in correspondence files at SSPO (SP-2063).

C. CHRONOLOGICAL SEQUENCE OF EVENTS

The TRIDENT LDS functional manager, Director, Strategic Systems Program Office (DIRSSP) submitted the fiscal year (FY) 1984 System Decision Paper (SDP) for the TRIDENT LDS project for approval in June 1982. One of the issues the SDP identified was the need to replace the automatic data processing equipment (ADPE) at the Bangor production site. The projected cost of the ADPE was $4.425 million. Naval Data Automation (NAVDAC) approved the SDP on 24 September 1982 but required that the hardware replacement issue be presented as a separate issue in a modified version of a SDP for which NAVDAC coined the name Special Issue Decision Paper (SIDP). That SIDP was forwarded by DIRSSP on 8 August 1983. The SIDP reaffirmed the need for the hardware replacement based on a comprehensive workload analysis and projection for the Bangor site which indicated that the existing system would become saturated in late 1987 as new TRIDENT submarines became operational at the site. The SIDP identified three alternatives to satisfy the need. After a discussion of the appropriate economic and sensitivity analyses for each alternative, the SIDP recommended replacement of the existing equipment with new hardware acquired in a competitive procurement. The required $4.425 million was included in DIRSSP's FY 85 budget submission and was programmed for the FY 86 budget. The replacement project Plan of Action and Milestones (POA&M) called for equipment acquisition in June 1986 to be operational in June 1987.

The SIDP was submitted to NAVDAC via the Naval Material Command (NMC). NMC endorsed the SIDP recommending approval and stated that "Funds are available and have been included in the ADP Budget." In that NMC was the principal administering office for CAP funds, DIRSSP managers understood the NMC endorsement to mean that CAP funding for the LDS project was available as requested if LCM approval was granted.

On 28 November 1983 the Assistant Secretary of the Navy (Financial Management) (ASN(FM)) gave LCM approval to the SIDP and included in the approval the caveat "subject to the availability of adequate funding." On 14 December 1983 NAVDAC issued the formal LCM approval of the SIDP by referencing the ASN(FM) memorandum.

As a result of additional workload analyses and projections prompted by improved delivery schedules and subsequent concurrent refit schedules for new construction Trident submarines, the need to accelerate the hardware replacement project was identified. On 10 May 1984, DIRSSP submitted a request for funding adjustments to support the acceleration of the equipment replacement from June 1986 to February 1985 (FY 86 budget to FY 85 budget). The request was submitted to NAVDAC via NMC for consideration as an unfunded OPN CAP requirement for FY 85 at the FY 84 mid-year budget review.

DIRSSP also identified an alternate acquisition strategy which called for acquiring the required hardware under an existing Naval Supply Systems Command contract for computer

hardware (NAVSUP Inventory Control Point Resolicitation Project). This strategy was based on the commonality between the interests and goals of LDS and the ICP project and would require only $3.166 million. This strategy would also support the new required delivery data for the replacement of the hardware. On 15 May 1984 a request for approval of the new acquisition strategy was submitted to NAVDAC via NMC. NMC endorsed the request recommending that the alternate acquisition strategy be approved and stated that "Funds are available and have been included in both the ADP budget and the Computer Acquisition Program (CAP)."

The ASN(FM) issued a memorandum approving the new acquisition strategy on 3 August 1984. That memorandum read in part: "Approval is granted to acquire replacement ADP equipment in support of TRIDENT LDS as outlined in Reference (a) [DIRSSP request dated 15 May 1984]. . . . This approval is subject to the availability of adequate funding."

NAVDAC issued the formal approval of the new acquisition strategy on 15 August 1984. That approval read in part: "Approval has been granted for PM-1 [DIRSSP] to acquire the requested ADP equipment as outlined in Reference (a) [DIRSSP request dated 15 May 1984] in support of the TRIDENT LDS."

On 17 October 1984 DIRSSP, believing that both project and funding approval had been granted, submitted a request for CAP funds for the acquisition of TRIDENT LDS ADPE for the Bangor production site to NAVDAC via NMC citing the two

ASN(FM) approval memorandums as references. A contractual document, Request For Contractual Procurement--NAVCOMPT FORM 2276, citing the NAVSUP ICP resolicitation contract was submitted as an enclosure to that request. The requested CAP fund citation totaled $3.166 million.

Unofficially, DIRSPP managers learned that the funding request would be delayed at NAVDAC. It was important that the project proceed according to the established POA&M to support the TRIDENT submarine refit schedule in 1985. On 31 October 1984, LCM and CAP representatives from NAVDAC; Director, DON Information Resources Management (DIRDONIRM/OPNAV-945); NMC; DIRSSP; and others, met and discussed the LDS project including the need to accelerate the hardware replacement at Bangor and the accompanying need to move the CAP funding from FY 86 to FY 85. No decision on the funding was reached during the meeting. On 1 November 1984, the NAVDAC CAP custodian telephoned DIRSSP to relate that the decision had been made to fund the replacement hardware in FY 85 as requested.

Subsequently NAVDAC stated that prior to funding the hardware replacement in FY 85, NAVDAC would have to first approve the need to accelerate the purchase. A meeting was held on 9 November 1984 to discuss that issue. NAVDAC indicated it could support the need to accelerate the purchase and would make their final position known not later than 17 November 1984. FY 85 OPN CAP funds had not been released from NMC to NAVDAC as of the 9 November 1984 meeting.

On 15 November 1984, NMC as the principal administering office for the Other Procurement, Navy (OPN) appropriation endorsed the 17 October 1984 DIRSSP request releasing $3.166 million from the OPN CAP for the LDS project and forwarded the request to NAVDAC via the Chief of Naval Operations (CNO). The NMC endorsement related the following:

> The FY 1985 President's Budget for the Computer Acquisition Program was submitted at $242.7M. Final Congressional action produced an authorization of $144.6M and an appropriation of $208.8M. However, the difference between authorization and appropriation is effectively frozen until reconciliation can be achieved. Distribution of that $64.2M among claimants has not yet been made. Additionally, allocation of the undistributed reductions levied against the OPN appropriation are held in abeyance pending NAVCOMPT evaluation of sponsor recommendations.

OPNAV 923, as the administering office for the CAP line item in the OPN appropriation, completed the funding authorization forwarded by NMC and then forwarded the 17 October 1984 DIRSSP request to NAVDAC on 6 December 1984.

DIRSSP submitted a request for LCM approval of an updated Trident LDS SDP-III (or SIDP) for the hardware replacement to NAVDAC via NMC on 20 December 1984. This update reflected the new acquisition strategy approved by the ASN(FM) in August 1984 and the accelerated schedule required to support the submarine refits. NMC recommended approval of the SDP on 11 January 1985 and stated that "Funds are available."

On 18 January 1985 NAVDAC granted authority for the acquisition of the replacement ADPE at Bangor; however, LCM approval of the SDP-III was deferred until LDS software was

fully converted and tested and an on-site system review was conducted by NAVDAC.

When DIRSSP personnel inquired of NAVDAC as to the status of the funding citation on 4 February 1985, they were told that, despite the NMC and OPNAV-923 endorsements which set aside $3.166 million for LDS, CAP funds were not available for the TRIDENT LDS hardware replacement. There had been undistributed reductions in the OPN appropriation which caused deferrals in the CAP fund (i.e., only a portion of the appropriation had been apportioned), and other procurement documents were being processed ahead of the LDS document (first come, first served) which would deplete the available cash. After several additional telephone conversations between high level managers at DIRSSP, NMC, and NAVDAC, NAVDAC agreed to process the DIRSSP NAVCOMPT 2276 ahead of others thereby making CAP funds available. It is not known how many other projects were affected (i.e., not funded) by this action.

On 20 February 1985 NAVDAC forwarded the Request for Contractual Procurement (NAVCOMPT FORM 2276) to the Automatic Data Processing Selection Office with a CAP fund citation of $3,166,000.00.

Installation of hardware was completed in Bangor during the week of 8 March 1985. Final acceptance of and transition to the new hardware was completed in September 1985. The refit schedule was supported.

NAVDAC completed its on-site review in October 1985.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. GENERAL

The central objective of this thesis has been two-fold: to describe the DON system of management control with respect to the acquisition of automatic data processing and information system (ADP/IS) equipment; and to discuss the DON control system in terms of the theoretical concept of a management control system. The purpose was to identify strengths and weaknesses and to make recommendations for improvements. This chapter presents the conclusions and recommendations reached in the course of the study. General conclusions are presented in the next two sections, and recommendations for improvement are presented in the fourth section.

B. LIFE CYCLE MANAGEMENT SYSTEM

The Life Cycle Management system of acquisition control is a well documented system in the DOD and DON literature. The documentation is particularly thorough with respect to the acquisition of ADP/IS. SECNAVINST 5000.1, 1983, SECNAVINST 5231.1B, 1985, and NAVDAC publications 24.1 and 24.2, 1983, clearly define the intent of the ADP/IS acquisition system and describe in detail the system structure and process including required documentation formats and content.

The system structure of life cycle phases and decision milestones support a control process that is very similar to

the one described by Anthony, Dearden, and Bedford (1984) and presented in Chapter II of this thesis. The acquisition strategy document or project management plan (PMP) is the overall planning tool for the acquisition project manager and is a basic document in the life cycle management (LCM) process. Within the PMP the various functional elements which will be required to be performed over the life of the acquisition project are identified. Resource requirements for these functions (programs) are projected over the life cycle phases of the project. Budgets for the functional elements are developed and projected across the life cycle phases. Operating costs are recorded by functional element and by performing activity (responsibility center). These programming, budgeting, and operating results are summarized in the form of a System Decision Paper (SDP) and presented for review and approval at each decision milestone or as required by an approval authority. The data presented in the SDP are used to evaluate performance during the preceding life cycle phase and to support the adjustment of the PMP for future life cycle phases.

A weakness in the LCM system is the potential for inappropriate or ineffective interface between the LCM system and the PPBS/CAP system. The interface must be effective as the LCM system is dependent upon the CAP system for acquisition funds to support the ADP/IS project. The LCM milestone approval of programming and budgeting decisions is not an

authorization to obligate or expend funds. Project planning, therefore, must be based on the contingency that LCM funding decisions will be transmitted to and subsequently approved in the PPBS/CAP system. If the interface between the systems is not effective, managers may become frustrated as they attempt to execute their programs before funding is available. This was the case in the TRIDENT LDS hardware replacement case when DIRSSP submitted a Request of Contractual Procurement (NAVCOMPT FORM 2276) in October 1984. DIRSSP managers believed all requisite approvals had been granted. Actual funding was not obtained until February 1985, and then, only after intervention by high level authorities within the various activities. The delay in providing the funding citation of almost 120 days in many situations would not have been critical: however, in this case, further delay would have had serious impact on a major strategic support system.

The DON LCM directives recognize the reliance on the second system and task decision authorities, resource sponsors, and project managers with the responsibility for reconciling LCM decisions with PPBS/CAP priorities and status (SECNANINST 5000.1, 1983; SECNAVINST 5231.1B, 1985). NAVDAC is a central participant in the CAP LCM system responsible under SECNAVINST 5231.1B for "publishing LCM documentation requirements" and "providing LCM technical advice and assistance to all DON components as needed." NAVDAC is also the designated approval authority for many ADP/IS projects. This participation in the

LCM system combined with its role as the CAP financial manager results in NAVDAC being a primary interface between the LCM system and the PPBS/CAP. Resource sponsors are also identified in SECNAVINST 5231.1B as an interface between the two systems. However, the individual acquisition project managers are the primary interfaces between their respective individual projects and the PPBS/CAP. The degree of uncertainty associated with LCM decisions appears to be a function of how well project and resource managers are able to fulfill their responsibilities by providing an interface between the two systems and causing the decisions within the two systems to be reconciled.

C. PPBS/CAP SYSTEM

The PPBS/CAP system, like the LCM system, is well documented in the DOD and DON literature. CAP objectives are clearly stated, and the system structure and process are well defined. The overall PPBS/CAP system provides management with substantial flexibility in the use of resources in accomplishing mission goals while ensuring that those resources are obtained and used effectively and efficiently. The need for flexibility is based on the uncertainties of both mission requirements and on the total resource availability. Although the PPBS/CAP system is well defined, the actual operation of the system is complex as was discussed in Chapter IV. The complexity of the PPBS/CAP system simply reflects the complexity of the organization's missions and the multiple

integrated functions and management structure required to accomplish those missions.

A general weakness of the PPBS/CAP system is that its complexity tends to amplify the uncertainty involved in LCM funding decisions by making it difficult to determine the status of a particular requirement as it moves through the PPBS/CAP system. This is particularly true if managers are not thoroughly knowledgeable of the PPBS/CAP system and of the relationship of LCM decisions to the CAP. Given the continued use of separate systems (LCM and CAP) to control ADP/IS acquisitions; the complexity of the CAP system; and the concerns for coordinated decision making within the two systems as expressed in the DON directives and literature; there appears to be a need to improve the interfaces between the two systems.

A specific weakness in the CAP system identified in Chapter IV and implied in the TRIDENT LDS case is the lack of a formal decision mechanism to be used to allot available CAP funds (the apportionment of the CAP line item in the OPN appropriation) given that the total available fund is less than the planned budget estimate.

Given the programming and budgeting in the CAP system tend to prioritize ADP/IS requirements on the basis of effectiveness or contribution towards DON mission objectives; and, that budget approval is granted to those requirements which, when considered collectively, result in the greatest total

DON effectiveness for the given level of resources; the subsequent allotment (expenditure) of funds should conform to the approved plan to ensure the efficient overall use of the resources. As was the case for the theoretical system discussed by Anthony and Young (1984), the CAP system should have a well understood mechanism for adjusting the plan to the situational realities. The proper operation of the mechanism is required to ensure that the three functions of a control system identified by Emery (1969) and presented in Chapter II are achieved. It would prevent planning from becoming a "superficial exericse;" it would guard against excessive deviation from the plan resulting in breakdowns in communication and coordination; and, it would provide feedback to be used to improve the planning process.

D. RECOMMENDATIONS

The first recommendation addresses the reduction of the potential for ineffective interface between the LCM and CAP systems and the resultant uncertainties involved in LCM system funding decisions. Given the continued use of the two interrelated systems, strengthening the interfaces between the two systems by increasing the knowledge and awareness of LCM system managers would reduce the level of uncertainty and improve the decision coordination. It is recommended that LCM project managers be given formal training in the operation of the PPBS/CAP system. As mentioned earlier, NAVDAC is a central participant in the CAP LCM system responsible under

SECNAVINST 5231.1B for "publishing LCM documentation requirements" and "providing LCM technical advice and assistance to all DON components as needed." In view of this tasking and the other roles in the two systems played by NAVDAC, it is recommended that NAVDAC provide or coordinate the training. It would appear, given the resources already in place at NAVDAC, that the cost of the recommended training would be relatively inexpensive.

The second recommendation addresses the lack of a CAP fund allotment decision mechanism to be used given that apportioned funds are less than approved budget estimates. It is recommended that the appropriation sponsor formalize a contingency procedure to be followed given the occurrence of the contingency. The procedure should call for a review and reclama process to be conducted for all approved budget estimate items. The procedure would help to maintain the overall effective and efficient use of the total available CAP fund and to keep all project managers informed as to the status of their requirements. The output of the process would be a prioritization of approved CAP projects. NAVDAC would then allot funds according to the priority listing and make recommendations for adjustments as the allotments were actually executed over the fiscal year. The Director, DON Information Resources Management (DIRDONIRM/OPNAV-945) with advice and assistance from NAVDAC appears to have the proper DON perspective to conduct such a review. This solution would involve

decision makers from both the PPBS/CAP and the LCM systems and should provide for the effective and efficient use of the available CAP resources given current situational realities. Although the procedure would further lengthen the overall process, the procedure would only be invoked in the occurrence of the contingency.

E. RECOMMENDATIONS FOR FUTURE STUDY

The lack of quantitative measures of LCM and/or CAP system effectiveness and efficiency handicap all efforts to analyze the two systems. The development of such measures would appear to be beneficial. Research into private sector practices of controlling the acquisition of assets similar to ADP/IS might indicate potential measures.

Alternately, an evaluation of CAP system effectiveness and efficiency using a surrogate measure such as the administrative cost of maintaining and operating the CAP system as a separate appropriation line item is recommended. The analysis would involve the development of a cost accumulation model capable of measuring the costs of administering the CAP as a separate appropriation line item. The output data from the model could then be compared to the total value of the CAP line item to evaluate the relative efficiency of operating the CAP system.

Using the same or a similar model, it might also be possible to identify a threshold value for individual ADP/IS

projects under which it is not economical to have the project participate in the CAP system. Instead, the project would be financed entirely from operating funds.

THE TRIDENT LOGISTIC DATA SYSTEM

HISTORICAL DEVELOPMENT, CURRENT STATUS
AND
FUTURE INITIATIVES

DATE MAR 1985
REV 2

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EXECUTIVE SUMMARY

This document has been prepared to serve as a replacement for the TRIDENT Logistic Data System Historical Development, Evolution, and Relationship to the TRIDENT Maintenance Management System document, dated June 1984 (with Revision 1).

The purpose of this document is to:

a. Summarize development of the TRIDENT Logistic Data System (LDS).

b. Describe the current status of TRIDENT LDS, including the management/operational organization.

c. Describe future TRIDENT LDS initiatives.

d. Provide an overview of the various LDS interfaces and analyze their impact.

For ease of understanding, several tables and figures have been included depicting LDS system interrelationships, operational and technical organizations involved in LDS activities, and LDS hardware/software development over the past twelve years. More detailed information regarding TRIDENT LDS can be found in the TRIDENT Logistic Data System Project Management Plan.

SECTION 1
INTRODUCTION

1.1 GENERAL

The TRIDENT System was established to provide a sea-based, strategic deterrent system with increased survivability, reliability and availability. A major element of this system is the OHIO Class submarine, possessing greater on-line availability than any other existing SSBN class. To achieve and maintain this higher level of on-line availability, the OHIO Class submarine normally operates on a 70 day patrol - 25 day off-patrol cycle (of which 18 days are dedicated to extensive refit actions and 7 days to weapons handling and other replenishment activities) for a minimum of nine years between depot availability periods.

Accordingly, OHIO Class SSBNs will be supported from dedicated TRIDENT submarine bases located in the contiguous United States. Operational and logistic support commands will be established under appropriate major claimants to support TRIDENT SSBN maintenance, training, replenishment, and operational requirements. The lead ship, USS OHIO (SSBN 726), was delivered 28 October 1981. Current program planning calls for the procurement of 19 additional ships. To date, 13 ships have been authorized and four delivered to the fleet. SUBASE Bangor, Washington has been operational since July 1981 and SUBASE Kings Bay, Georgia is undergoing activation with a scheduled OHIO Class submarine support date of October 1989.

1.2 BACKGROUND

To ensure OHIO Class submarine operational availability, life cycle logistic support of the TRIDENT System is directed by OPNAVINST 4000.82, "Logistic Support of the TRIDENT System" (to be replaced by OPNAVINST 4000.57E, "Logistic Support of TRIDENT and POSEIDON Fleet Ballistic Missile (FBM) Systems"). An integrated TRIDENT Logistic Support System has been established to ensure all logistic elements that support the TRIDENT system are properly planned and coordinated. The development of this System utilized the Logistic Support Analysis (LSA) methodology which links logistic resource requirements to specific maintenance actions. The complexity of logistic support requirements and the limitations of the refit

"window" necessitated the development of an automated management information system if operational commitments were to be met. The TRIDENT Logistic Data System (LDS) has been developed to fulfill this need.

1.3 TRIDENT LDS PURPOSE

The TRIDENT LDS is designed to provide the automated information essential for planning, execution and performance assessment of OHIO Class submarine maintenance actions; to support configuration status accounting; and to provide integrated logistic support information to Logistic Element Managers (LEMs), Participating Managers (PARMs) and other operational phase planners and users.

1.4 TRIDENT LDS DESCRIPTION

The TRIDENT LDS is a major Automated Information System (AIS) developed to support the OHIO Class submarine in its acquisition, transition (fitting out) and operational phases. The LDS is composed of software systems, both Navy-standard and TRIDENT-unique; a hardware suite with elements in multiple locations; and data communications links between locations. As the principal repository for configuration and refit management data, the TRIDENT LDS is an essential element of the total TRIDENT Logistic Support System. The TRIDENT LDS integrates planning and production data necessary to complete OHIO Class submarine maintenance and replenishment. A "Family Tree" of current TRIDENT LDS Application Systems is provided in Figure 1-1.

The TRIDENT LDS incorporates both TRIDENT-unique and Navy standard data systems in six major software applications systems and one major environmental software system as follows:

a. The Logistic Support Data System (LSDS) consists of TRIDENT-unique subsystems, the Ohio Class LSA data base, supporting application programs and associated interfaces. Sub-systems include the Logistic Acquisition/Operation System (LA/OS), Uniform Inventory Control Point Interface (UICP/I), Depot Availability Work Planning System (DAWPS), and TRIPER Management System (TMS).

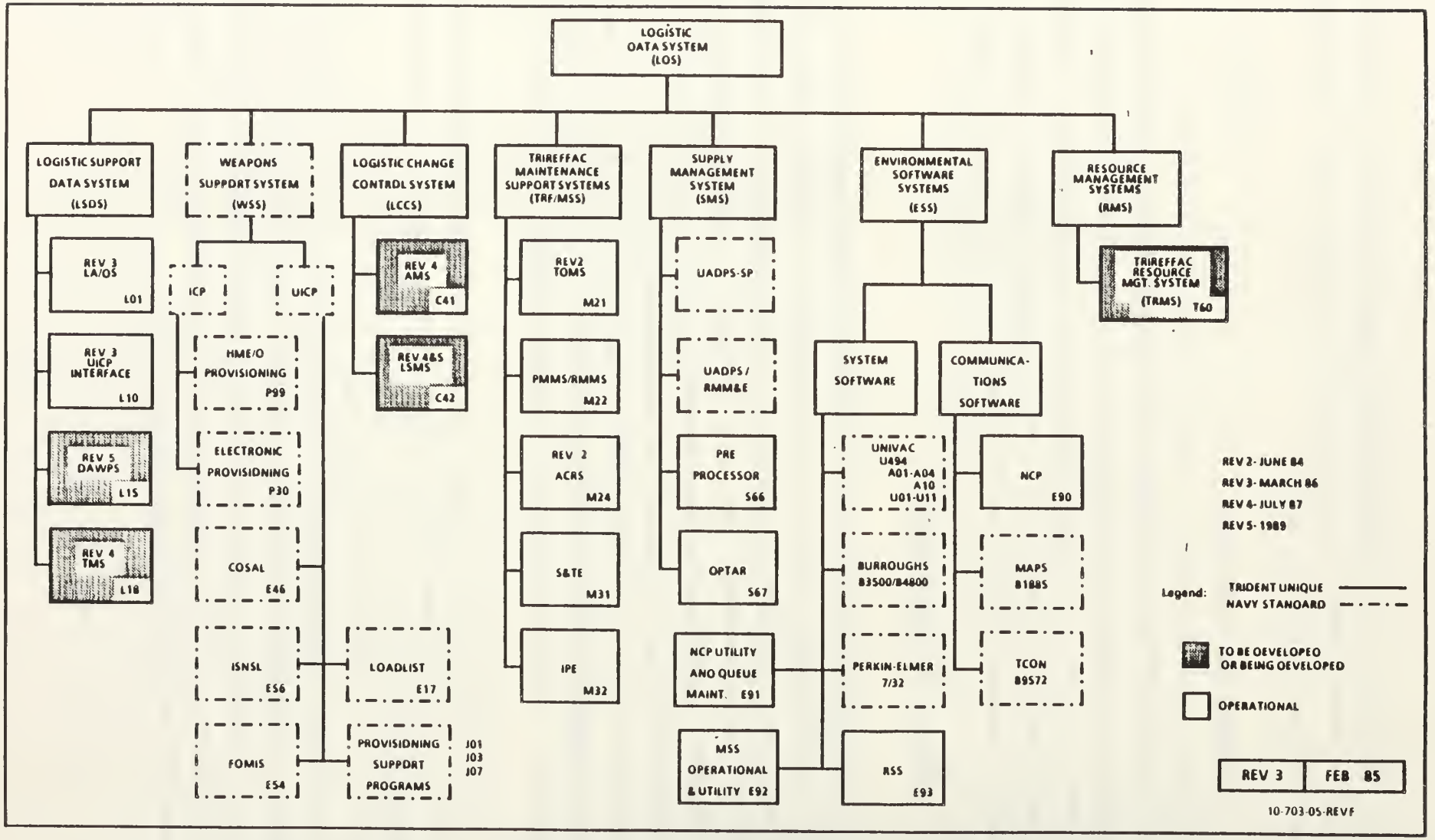

FIGURE 1-1 LDS FAMILY TREE

b. The Weapons Support System (WSS) consists of standard Navy ICP and UICP programs with TRIDENT-unique data bases and options which, when interfaced with other appropriate LDS programs, permit linkage necessary for accomplishing TRIDENT replenishment and generating various load lists such as COSALs and COSBALs.

c. The TRIREFFAC Maintenance Support System (TRF/MSS) provides the maintenance planning function and supports the execution of the 18 - day refit period. Subsystems are the Planned Maintenance Management System/Refit Maintenance Management System (PMMS/RMMS), Technical Documentation Management System (TDMS), Support and Test Equipment (S&TE) System, Industrial Plant Equipment (IPE) System, and the Automated Calibration Recall System (ACRS).

d. The Logistic Change Control System (LCCS) will consist of two major subsystems, the Alteration Management System (AMS) and the Logistic Support Monitoring System (LSMS). AMS will provide data system support for the TRIDENT Change Management Program. LSMS will provide data system support for maintenance of the TRIDENT Logistic Support System and ILS Effectiveness Assessment (ILSEA) Program including: identification and correction of logistic support deficiencies pertaining to OHIO Class submarines; identification, development and implementation of changes to logistic support dictated by approved configuration changes to OHIO Class submarine systems, equipment, and components.

e. The Supply Management System (SMS) provides the capability for requisitioning, inventory tracking, receipt processing, end-use accounting and some unique features designed to support the interface between maintenance and supply. Subsystems include the Pre-Processor Module (PPM), Operating Target and Reporting (OPTAR) System and Navy-standard systems: Uniform Automated Data Processing System for Stock Points (UADPS-SP) and Uniform Automated Data Processing System/Requisition Material Monitoring and Expediting (UADPS/RMM&E).

f. Resource Management Systems (RMS) are automated systems to support TRIDENT System activities in areas of budget and finance, personnel resources management, safety and security, and public works. The only RMS defined to date is the TRIREFFAC Resource Management System (TRMS), being implemented to support TRIREFFAC Bangor and TRIREFFAC Kings Bay.

g. Environmental Software Systems (ESS) consist of host software operating systems and software utility environments to support LDS applications and the networking of computers and peripheral devices that form the TRIDENT Logistic Data System. These systems are normally transparent to the user.

1.5 ORGANIZATION

Figure 1-2 summarizes the organizational relationships for TRIDENT LDS development and operations. Developmental and operational management responsibilities, as defined by SECNAVINST 5231.1 (Series), are further described in the TRIDENT LDS Project Management Plan (PMP).

a. TRIDENT LDS Approval Authority. Assistant Secretary of the Navy for Financial Management (ASN(FM))

b. TRIDENT LDS Functional Sponsor. Chief of Naval Operations (CNO), (OP21)

c. TRIDENT LDS Functional Manager. Director, Strategic Systems Programs (DIRSSP), (SP206)

d. TRIDENT LDS Project Manager. Commander, Naval Sea Systems Command (COMNAVSEA), (NAVSEA 921A3)

e. TRIDENT LDS ADPE and Data Communications Manager. Commanding Officer, Navy Ships Parts Control Center (CO SPCC), (SPCC 88)

f. TRIDENT LDS Central Design Agent. Commanding Officer, Navy Fleet Material Support Office (CO FMSO), (FMSO 96T)

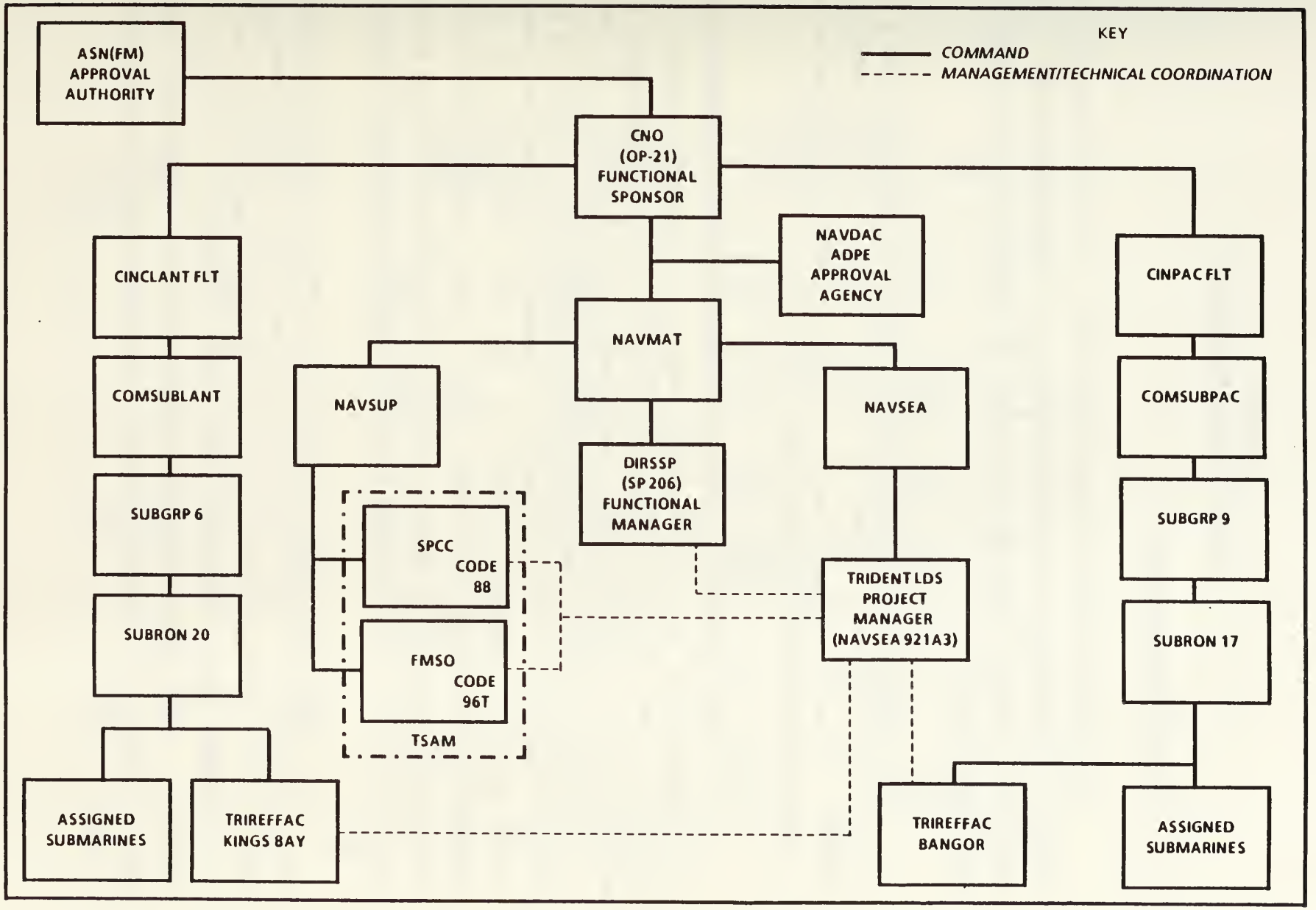

FIGURE 1-2: TRIDENT LDS DEVELOPMENT AND OPERATIONAL ORGANIZATION

SECTION 2
TRIDENT LDS DEVELOPMENT

2.1 DEVELOPMENT STAGES

The TRIDENT LDS development began in 1973. Full LDS capabilities are being acquired in discrete stages (previously referred to as Revisions/Milestones) in parallel with TRIDENT System development requirements. These stages, shown in Figure 2-1, are described as follows:

a. Stage 1 (1973-1974). In the first stage, LDS was conceived as a central computer with data bases resident at TRIDENT Support Activities, Mechanicsburg (TSAM). The central computer was to be linked by telecommunications to remote terminals at TRIDENT Refit Facility (TRIREFFAC) Bangor.

b. Stage 2 (1975-1976). When the operational Requirements Statements (RSs) were established as part of the second stage, the centralized concept became questionable, since the Logistic Support Analysis File (LSAF) data developed for the acquisition process was not suitable for the operational period. The major problem lay in the operational necessity to organize maintenance requirements into discrete jobs for production management during refit periods. A secondary problem was the necessity to provide post-refit information required by the Navy Maintenance and Material Management (3-M) System (OPNAVINST 4790.4). These problems were resolved by modifying the existing ADP design to provide greater capability at Navy Ships Parts Control Center (SPCC) and developing a computer capability at TRIREFFAC Bangor.

c. Stage 3 (1977-1981). During the third stage, software development and hardware procurement to support this revised design was completed. While developing the third stage, it became apparent that all logistic information support requirements could not be satisfied through the central LDS within constrained time frames. Some requirements were of local interest only and were better served through locally controlled system development, while other requirements were satisfied through development of LDS prototype systems.

	STAGE 1	STAGE 2	STAGE 3	STAGE 4	
Element	1973-1974	1975-1976	1977-1981	1982-1985	Future
SOFTWARE					
	LSAF	LSAF	Logistic Support Data System	Logistic Support Data System	Logistic Support Data System
	UICP Interfaces	UICP Interfaces	UICP Interfaces	Weapons Support System	Weapons Support System
	SUADPS RPM&T	UADPS-SP RPM&T	UADPS-SP SMSPPM SUPSTARS OPTAR	Supply Management System	Supply Management System
	MMDS	MMDS Expanded	MMDS Expanded	TRIREFFAC Maintenance Support System	TRIREFFAC Maintenance Support System
		CSAS Repairables Mgmt TRIREFFAC Admin	TRIPER CSAS LSMS/AMS TRIREFFAC Admin	Logistic Change Control System	Logistic Change Control System Office Automation/TRMS TMS/DAWPS
			TAPS TOTAL	Environmental Software System	Environmental Software System Other Systems
HARDWARE					
Mechanicsburg	1 U-494	1 U-494 1 Mini (FEP)	1 U-494 2 ID 7/32 (Test Bed)	1 U-494 2 IBM 4381 (LDS Support System) 1 IBM 3081 (ICP)	UADPS ICP (IBM 3081) Resolicitation SPLICE LDS Support System
Bangor	Undefined	1 Mini (MMDS) 1 Mini (Communications) Share B-3500/B-4700 (UADPS)	2 ID 7/32 (MMDS) Undefined(Maps) 2 ID 7/32 (NCP) Share B-3500 (UADPS)	2 IBM 4381 (applications) B4800 (UADPS)	Life Cycle Production System UADPS-SP Resolicitation SPLICE
Kings Bay	--	--	--	Advance Planning Begun	To be completed by 1989
COMMUNICATIONS					
Intrasite	Not addressed	Telecommunications Net	TLDSN	TLDSN TRINET	Local Area Network
Intersite	6400 Baud Line	1 4800 Baud Line 1 9600 Baud Line	TLDCN	Automated Dial-up TLDCN Tape-to-Tape	Remote Area Network Automated Dial-up Tape-to-Tape DDN/SPLICE

FIGURE 2-1 TRIDENT LDS DEVELOPMENT STAGES

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A Maintenance Management System (MMS), originally developed and described in the TRIDENT Submarine ILS Master Plan (NAVSEA 0905-501-7010), was planned with LDS as the primary MMS data system support capability. However, as the LDS design evolved, its capabilities incorporated a majority of the MMS functions, thereby integrating the MMS within the larger concept of TRIDENT life cycle logistic support.

The major portion of the operational phase LDS baseline requirements were implemented in July 1982, thus permitting submarine predeployment maintenance support. The TRIREFFAC Bangor Maintenance Support System was activated using Perkin-Elmer 7/32 hardware. The Supply Management System (SMS) (Burroughs-4800) hardware and associated software systems were installed at NSC Puget Sound.

Also during the third stage, the Secretary of the Navy announced in May 1979, that an Atlantic Coast Strategic Submarine Base would be located at Kings Bay, Georgia. An additional component of the LDS similar to that at Bangor, will be installed at TRIREFFAC Kings Bay during the 1987-1989 time frame to support Ohio Class submarines assigned to the Atlantic Fleet. This requirement, together with rapidly increasing refit workloads at TRIREFFAC Bangor and a need to further integrate the LDS in its emergent integrated logistic system environment, led to stage four in the LDS evolution.

d. Stage 4 (1982-1985). Since commencement of the fourth and current stage in 1982, a series of performance evaluations identified system deficiencies within the current TRIDENT Refit Facility/Maintenance Support System (TRF/MSS) production hardware at Bangor. These deficiencies ranged from slow data terminal response time to an inability to support expected data base growth. Further hardware system degradation in processing projected workloads was predicted as additional OHIO Class hulls become operational, resulting in concurrent refits at TRIREFFAC Bangor by June 1985. The replacement of the Perkin-Elmer 7/32 TRF/MSS hardware with IBM 4381 hardware at TRIREFFAC Bangor is being rapidly accomplished using the Inventory Control Point (ICP) Resolicitation Project contract as a procurement source. Also, in late 1984, the Burroughs-4800 hardware was relocated from NSC Puget Sound to the new ADP facility at TRIREFFAC Bangor to perform local SMS functions and to support expanded SMS data communications requirements.

A Readiness Review for the TRF/MSS hardware replacement at TRIREFFAC Bangor was conducted in January 1985. With the approval of the hardware replacement and as a result of this review, the IBM 4381 hardware is being installed for full operation in late 1985. Concurrently, the TSAM Perkin Elmer 7/32 systems at Mechanicsburg used for software development and contingency backup of the TRIREFFAC production system have been replaced with a dual IBM 4381 system similar to that being activated at TRIREFFAC Bangor. (The TSAM 4381 system serves as the conversion site for LDS software from Perkin Elmer to IBM, and as the backup site for the TRF/MSS production systems). Also, as part of the ICP Resolicitation Project, an IBM 3081 was installed at SPCC to ultimately replace the TRIDENT dedicated UNIVAC-494 LSAF host system. Presently, the IBM 3081 is colocated with the UNIVAC-494 at TSAM. The resolicitation upgrade hardware will permit TRIDENT LDS users direct on-line access to an expanded and restructured TRIDENT Logistic Support Analysis File (LSAF) data base that will also meet operational phase requirements through improved software environmental efficiency and increased operational hardware capability.

With upgraded LDS ADPE, TSAM will function as the TRIDENT LDS Support System Coordinator. The TSAM LDS Support System site will perform hardware/software development testing and provide backup capabilities for TRF/MSS at both the TRIREFFACs, also serving as an LDS user link to the SPCC IBM 3081 (LSAF host) when the UNIVAC-494 to IBM 3081 software conversion is complete.

New LDS application software systems implemented during FY 1984 included the Automated Calibration Recall System (ACRS) and Technical Documentation Management System (TDMS), which replaced the Logistic Technical Data (LTD) System. Three additional LDS subsystems, the TRIPER Management System (TMS), Alteration Management System (AMS), and Logistic Support Monitoring System (LSMS), are under development to meet Ohio Class submarine operating cycle support requirements.

In response to the planned activation of TRIREFFAC Kings Bay in 1989, the Kings Bay ADP Acquisition and Activation Document (KBAAAD) has been prepared by DIRSSP (SP206) for the implementation of non-tactical ADP support at SUBASE Kings Bay, including LDS, office automation and other ADP support functions (such as automated warehousing) as they evolve. The TRIDENT System ILS Project Office (SEA 921A3) has been designated as the TRIREFFAC Kings Bay ADP Principal Support Planner responsible for ADP implementation at TRIREFFAC Kings Bay.

NAVSEA (SEA921A3) has developed the TRIREFFAC Kings Bay ADP Acquisition and Activation (A&A) Management Plan to guide ADP implementation efforts for TRIREFFAC Kings Bay.

2.2 FUTURE INITIATIVES

Initiatives for continuation of LDS development and implementation include:

a. HARDWARE

Current LDS hardware initiatives are summarized as follows:

(1) SPCC - The Naval Supply Systems Command, under the Inventory Control Point (ICP) Resolicitation Project, will provide Navy-wide replacement/upgrade of the inventory control point computer systems. Data bases located in the SPCC UNIVAC -494s are currently under conversion to the IBM 3081 systems. The UNIVAC - 494 is to be phased down as the IBM system demonstrates its full operational support capability.

(2) TRIREFFAC Bangor - TRF/MSS replacement (IBM 4381s) hardware and software installation and activation is scheduled to be completed by the end of 1985. Enhanced data communications, including local links between the IBM MSS host and the Burroughs-4800 SMS host and remote links to TSAM, Mechanicsburg, will also be provided.

(3) TRIREFFAC Kings Bay - TRF/MSS hardware acquisition and activation for TRIREFFAC Kings Bay is scheduled to commence in late 1988. The SMS system at Kings Bay will be installed and activated in early 1987, probably using upgraded (Burroughs-4925) hardware.

(4) Contingency plans for Strategic Weapons Facility, Pacific (SWFPAC) to provide backup to SMS (Burroughs-4800) at TRIREFFAC Bangor are under development. The Strategic Weapons Facility, Atlantic (SWFLANT) will provide the backup for SMS at TRIREFFAC Kings Bay. This approach has been reviewed and approved by DIRSSP letter 5230, 2064/1530 of 17 July 1984.

(5) TRMS, scheduled for installation at both TRIREFFAC Bangor and TRIREFFAC Kings Bay, is a real-time local management information system consisting of mini-computers (PCs) which function both in stand-alone mode and linked to data bases in the LDS IBM 4381 hosts. The TRIREFFAC Local Area Network (LAN) will provide the necessary data communication links to the IBM 4381.

(6) SPLICE (local) - Stock Point Logistics Integrated Communications Environment (SPLICE) is to be installed via TANDEM TXP hardware at TRIREFFAC Bangor to provide system interface between the TRF/MSS (IBM 4381) and Supply Management System (SMS) (Burroughs-4800). The required linkage software is under development to support Burroughs to IBM communications in conjunction with the ongoing TRF/MSS hardware replacement.

b. **SOFTWARE**

New software modules currently under development to expand LDS user capabilities include:

(1) TRIPER MANAGEMENT SYSTEM (TMS) to support the TRIDENT Planned Equipment Replacement (TRIPER) Program by providing a tracking system for inventory management, technical analysis and control, inactive equipment maintenance scheduling, change management and total TRIPER asset control.

(2) TRIREFFAC RESOURCE MANAGEMENT SYSTEM (TRMS) to support management of TRIREFFAC command activities in the areas of budget planning, safety records, personnel/training records, etc.

(3) ALTERATION MANAGEMENT SYSTEM (AMS) to support planning, development and implementation of configuration changes to TRIDENT submarines. AMS will provide data system support for the TRIDENT Change Management Program.

(4) LOGISTIC SUPPORT MONITORING SYSTEM (LSMS) to support assessment of the effectiveness of the TRIDENT Logistic Support System on a continuing basis, identify potential problem areas and track corrective actions.

(5) DEPOT AVAILABILITY WORK PLANNING SYSTEM (DAWPS), formerly the Overhaul Work Planning System (OWPS), to provide ILS information in support of OHIO Class submarine depot availability work package planning.

(6) LOGISTIC ACQUISITION/OPERATION SYSTEM (LA/OS). The LA/OS forms the baseline system for TRIDENT LDS by providing a multipurpose set of files and records at TSAM. Current efforts involve the restructure of LSAF, the data base for LA/OS, to support various logistic support disciplines and to provide for new data elements and relationships required for concurrent refits, and to take advantage of increased hardware capability provided by the ICP Resolicitation contract.

(7) SNAP II LDS INTERFACE SYSTEM (SLIS) to provide the Shipboard Non-Tactical ADP Program (SNAP II) system interface with LDS. Currently, SLIS is being defined and will be addressed separately in a Requirements Statement (RS).

(8) PYCC-INTERFACE. The expanded planning yard concept includes interaction of multiple logistic data support systems (See par 3.2.1). This integration requires ongoing specification and development of an enhanced LDS Planning Yard Component Configuration Status Accounting System (PYCCSAS) interface.

c. **PROGRAM MANAGEMENT**

DIRSSP (SP206) has been designated Functional ADP Lead Planner for non-tactical ADP computer resources to be installed throughout SUBASE Kings Bay. NAVSEA is designated the Principal Support Planner for ADP acquisition support for TRIREFFAC Kings Bay. The first milestone for TRIREFFAC Kings Bay ADP activation was reached in March 1985 with the issuance of the TRIREFFAC Kings Bay ADP A&A Management Plan.

Current LDS plans provide for an LDS hardware and software configuration at TRIREFFAC Kings Bay identical to the configuration at TRIREFFAC Bangor. Progress will continue to be measured by the completion of each milestone established in the TRIREFFAC Kings Bay ADP A&A Management Plan.

d. DATA COMMUNICATIONS

External data communications for TRIDENT LDS presently consist of leased land lines which provide both batch and on-line communication between the TRIREFFAC, SPCC and other participating TRIDENT activities. Local communications at each site include a network of host computers, Visual Display Terminals (VDTs), printers, and input-output devices. TRIREFFAC Kings Bay will require communication functional support similar to TRIREFFAC Bangor; however, a specific data communications system configuration is being defined and developed for Kings Bay.

TRIDENT maintenance and supply management require the exchange of TRIDENT related logistic data among various activities. The LDS data communications initiative "TRINET", initiated by SPCC, will define and implement both Local Area Network (LAN) requirements within the TRIREFFACs, and Remote Area Network (RAN) requirements to link ADPE resources at participating TRIDENT activities via the Defense Data Network (DDN).

SPLICE, when implemented with the DDN, will provide the hardware interface between TRF/MSS and SMS at each TRIREFFAC and the communication links between the TRIREFFACs and the TSAM LDS Support System at Mechanicsburg. Concurrent implementation of DDN nodes at other TRIDENT LDS support and interfacing activities (such as NAVSEA) will provide a TRIDENT LDS Network with fully automated capabilities for data exchange and remote processing of information.

e. ADP SECURITY ACCREDITATION

In accordance with OPNAVINST 5239.1A, all ADP systems and functions are to be accredited for risk and contingency backup. The TRIDENT LDS, as a unique Navy AIS system, is operating without security accreditation under an interim authority granted by DIRSSP. Annual extension of the interim authority to operate will be obtained until all elements of the LDS System have been accredited.

Accreditation for TRIDENT LDS, categorized as a Level II Sensitive Business Data System, will be incrementally obtained at each operating location. Local completion and approval of a Risk Assessment Plan, a Contingency Plan, and a Security Test &

Evaluation (ST&E) Plan, will allow each activity to obtain security accreditation for its cognizant portion of LDS. DIRSSP will provide final approval of LDS as a total system, after all LDS activities and the LDS data communications network have been individually accredited.

The LDS accreditation program is in progress with major milestones scheduled as follows:

(1) TRIREFFAC Bangor full accreditation is scheduled for completion in mid-1986. Although a Risk Assessment has been approved for the original Perkin-Elmer 7/32 hardware, a revised Risk Assessment Plan for the upgraded IBM 4381 hardware is scheduled for development and approval in 1985. A revised Contingency Plan is scheduled for update and approval by March 1986. ST&E approval is scheduled for May 1986.

(2) SPCC Mechanicsburg has initiated a Risk Assessment Plan with approval scheduled for August 1985. Approval for the SPCC Contingency Plan is scheduled for May 1986, with ST&E approval scheduled for August 1986.

(3) TRIREFFAC Kings Bay accreditation is scheduled for completion during the 1988-89 time frame, prior to Initial Operational Capability (IOC) in 1989.

(4) TRIDENT LDS Network accreditation, (the present link between TSAM and TRIREFFAC Bangor), is scheduled for late 1986, after independent accreditation approvals for TRIREFFAC Bangor and SPCC have been completed. Accreditation for the data communications link (DDN/SPLICE) is also required.

SECTION 3
LDS INTERFACES

3.1 EXISTING INTERFACES

The TRIDENT LDS has evolved in an atmosphere of transition from the "design and build" phase of the TRIDENT Program to the operational "patrol, refit and overhaul" phase of the TRIDENT life cycle. In a similar manner, the Integrated Logistic Support concept for the TRIDENT submarine fleet has evolved from concept to operational reality. In an effort to meet the rapidly expanding TRIDENT operational logistic support commitment, multiple Navy and contract support activities, including TSAM, TRICCSMA, PERA, NAVSEA and General Dynamics, Electric Boat Division, have created local management information systems and logistic support data files which contribute to the outfitting, refit and overhaul of TRIDENT submarines. While the LDS has served as the information focal point for TRIDENT refit activities, it exists in the larger logistic information environment defined as Integrated Logistic Support (ILS) Data Systems. Interfaces between LDS and ILS data systems have evolved for two reasons. First, ILS data systems contain essential logistic baseline data and refit planning data, such as that contained in the Maintenance Planning Management Information System (MPMIS) which supports creation of the Initial Refit Work Package at TRIREFFAC Bangor. Second, information feedback is required from the maintenance and configuration change functions of TRIREFFAC refit activities back to the design and logistic support baselines used in the ongoing construction of TRIDENT submarines.

Presently, LDS interfaces with external ILS data bases and systems exist on a manual basis, in the sense that they involve electronic transfer and remote print-out of data which is subsequently and selectively re-entered into other systems. The current stage four (1982-1985) LDS hardware enhancement program will facilitate the automation of many of these interfaces by permitting on-line remote access and updating of data between LDS and ILS data system hosts linked through DDN in accordance with the TRINET data communications scheme.

The TRIDENT Integrated Logistic Support (ILS) Data System Steering Group was established and chartered (in the LDS PMP) to plan LDS evolution and development of integrating interfaces between essential LDS and ILS data systems. Ongoing efforts include a major effort to define common data elements and codes within and between ILS Data Systems (including LDS), sponsored by NAVSEA.

3.2 INTERFACES UNDER DEVELOPMENT

3.2.1 PLANNING YARD COMPONENT CONFIGURATION STATUS ACCOUNTING SYSTEM (PYCCSAS)

The Planning Yard Component Configuration Status Accounting System (PYCCSAS) task assigns Electric Boat Division (EB DIV) the life cycle responsibility for accuracy and completeness of OHIO Class ship component configuration data. Implementation of the management plan for this task will make EB DIV, as the OHIO Class Planning Yard, the single authorized agent to add, delete or change OHIO Class component configuration data and logistics data in Level A of the Weapon Systems File, located at Ships Parts Control Center (SPCC). This centralized responsibility for the accuracy and completeness of component configuration status will improve configuration control by eliminating conflicting data among independent activity data bases.

The following TRIDENT ILS ADP systems are directly related to intended PYCCSAS functions:

*AMS - Alteration Management System (planned)
MPMIS - Maintenance Planning Management Information System
TCSAS - TRIDENT Configuration Status Accounting System
CDD - Command and Control System Document Data Base
*LA/OS - Logistic Acquisition/Operation System (planned structure)
*TMS - TRIPER Management System (planned)
ILS/EA - Integrated Logistic Support Effectiveness Assessment
CITS - Class ILS Tracking System
LSB - Logistics Support Baseline
LAMS - Logistic Alteration Management System
CC/ILS - ILS Change Control Data Base
TSTS - TRIPER Serial Number Tracking System
*DAWPS- Depot Availability Work Package System (planned)
*TDMS - Technical Documentation Management System
*LSMS - Logistic Support Monitoring System (planned)

*LDS Subsystem

The PYCCSAS is scheduled to be operational in September 1985. The first step provides for PYCCSAS terminals to access the WSF Download (WSFD) at SPCC. This will permit EB DIV to place Design Agent and Shipbuilder change data directly into the WSFD. An interface with SPCC Code 88 and the OHIO Class Supply Support LEM will also be established to ensure that all supply related acquisition and operational phase processes, such as FOMIS, LSA, TRIPER and major shores spares inventory are coordinated with the PYCCSAS functions.

Analysis is underway to identify the impact of PYCCSAS on existing ILS Data Systems and the appropriate PYCCSAS interface to these systems, including LDS.

3.2.2 SNAP II/LDS INTERFACE SYSTEM (SLIS)

Development of shipboard non-tactical automated systems was limited to large surface vessels until the advent of the Shipboard Non-Tactical ADP Program (SNAP), which took advantage of large scale microcircuit integration and its inherent savings in terms of cost and size. SNAP is operational aboard several surface ship classes and is being tailored for use aboard submarines, including Ohio Class submarines. Interfaces between SNAP and tender-based automated systems are being developed. A requirement exists to interface Ohio Class submarine SNAP II systems with the TRIDENT Logistic Data System (LDS) operated at TRIDENT Refit Facilities (TRIREFFACs) for refit and replenishment purposes.

The SNAP II/LDS Interface System (SLIS) will satisfy the following requirements:

(a) Maintenance actions deferred while on patrol will be transferred to the TRIREFFAC as digital data files to evaluate quickly the impact of required corrective maintenance on the planned refit work package, to initiate requisitions for needed maintenance materials, and to finalize the refit work package as soon after submarine arrival as possible.

(b) Material and technical documentation requisitions will be transferred as digital data files to the TRIREFFAC shore-based LDS for timely replenishment processing. Requisition status will be transferred as digital data files to the submarine.

(c) Configuration change actions completed on patrol will be transferred to the TRIREFFAC as digital data files to maintain accurate submarine configuration records in LDS. Configuration changes accomplished by TRIREFFAC during refits will be correspondingly transferred to the submarine's SNAP II files, thus creating a continuous configuration and logistic support control loop throughout the submarine's operating cycle.

(d) Support and test equipment calibration requirements will be digitally transferred to the TRIREFFAC LDS for maintenance scheduling and replenishment purposes. A continuous program will be implemented to ensure shipboard test equipment is serviced periodically and remains appropriate to the submarine's installed equipment configuration.

(e) Accurate, complete and timely refit feedback information from TRIREFFAC (LDS) to the submarine's SNAP II system will close deferred maintenance actions in SNAP II data records and update them for configuration changes, including TRIPER equipment rotations, accomplished during a refit period.

Maximum use of existing LDS and SNAP II software and data will be made during design and implementation of these interface/feedback features. However, new software requirements are anticipated for both LDS and SNAP II, and data element changes in both systems may be required for compatibility to support these interface requirements.

APPENDIX A
LIST OF ACRONYMS

ACRS	Automated Calibration Recall System
ADP	Automatic Data Processing
ADPE	Automatic Data Processing Equipment
AIS	Automated Information System
AMS	Alteration Management System
B	Burroughs
COSAL	Coordinated Shipboard Allowance List
COSBAL	Coordinated Shorebased Allowance List
CSAS	Configuration Status Accounting System
DAWPS	Depot Availability Work Planning System
DDN	Defense Data Network
EB	Electric Boat
ESS	Environmental Software System
FEP	Front End Processor
FOMIS	Fitting Out Management Information System
HME/O	Hull, Mechanical, Electrical/Ordnance
IBM	International Business Machines, Inc.
ICP	Inventory Control Point
ILSEA	Integrated Logistic Support Effectiveness Assessment
IOC	Initial Operational Capacity
IPE	Industrial Plant Equipment
KBAAAD	Kings Bay ADP Acquisition and Activation Document

LA/OS	Logistic Acquisition/Operation System
LAN	Local Area Network
LCCS	Logistic Change Control System
LDS	Logistic Data System
LEM	Logistic Element Manager
LSA	Logistic Support Analysis
LSAF	Logistic Support Analysis File
LSDS	Logistic Support Data System
LSMS	Logistic Support Monitoring System
LTD	Logistic Technical Data
MAPS	Multiple Activity Processing System
MMDS	Maintenance Management Data System
MMS	Maintenance Management System
MPMIS	Maintenance Planning Management Information System
MSS	Maintenance Support System
NCP	Network Control Processor
OPTAR	Operating Target and Reporting System
PARM	Participating Manager
PCs	Personal Computer(s)
PMMS	Planned Maintenance Management System
PMP	Project Management Plan
PPM	Pre-Processor Module
PYCC	Planning Yard Component Configuration
PYCCSAS	Planning Yard Component Configuration Status Accounting System
RAN	Remote Area Network
RMM&E	Requisition Material Monitoring and Expediting
RMMS	Refit Maintenance Management System
RMS	Resource Management System

RS	Requirements Statement
RSS	Recovery Software System
SDP	System Decision Paper
SIDP	Special Issue Decision Paper
SLIS	SNAP II LDS Interface System
SMS	Supply Management System
SNAP	Shipboard Non-tactical ADP Program
SPLICE	Stock Point Logistics Integrated Communications Environment
S&TE	Support and Test Equipment
ST&E	Security Test and Evaluation
SUADPS	Shipboard Uniform Automated Data Processing System
SUPSTARS	Supply Selective Treatment and Review System
SWFLANT	Strategic Weapons Facility, Atlantic
SWFPAC	Strategic Weapons Facility, Pacific
TAPS	Terminal Application Processing System (Informatics, Inc.)
TDMS	Technical Documentation Management System
TLDCN	TRIDENT Logistic Data Communications Network
TLDSN	TRIDENT Logistic Data System Network
TMS	TRIPER Management System
TOTAL	A data base management system (CINCOM Systems, Inc.)
TRIPER	TRIDENT Planned Equipment Replacement
TRIREFFAC	TRIDENT Refit Facility
TRMS	TRIDENT Resource Management System
TSAM	TRIDENT Support Activities Mechanicsburg, PA
U	UNIVAC
UADPS	Uniform Automated Data Processing System
UADPS-SP	Uniform Automated Data Processing System for Stock Points
UICP	Uniform Inventory Control Point
UICP/I	Uniform Inventory Control Point/Interface

VDT	Visual Display Terminal(s)
WSF	Weapon Systems File
WSFD	WSF Download
WSS	Weapons Support System

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